AUGUST 10, 1959

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

Fiber Metallurgy: Potential Applications Are Unlimited

Uses may range from battery plates to rocket nozzles. The process, spawned from papermaking and powder metallurgy techniques, makes possible a new class of materials that challenge metalworking's imagination. . Page 126

Most Steel Stocks Still Adequate As Strike Heads into Fifth Week

IAM Gains Members, Counters Trends

28 Ways to Go Out of Business

Machine Tool Orders to Rise 24%

Automatic Control Made Easy (For Guys Who Hate Slide Rules)

Refractories Slowed by Strike

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METALWORKING OUTLOOK
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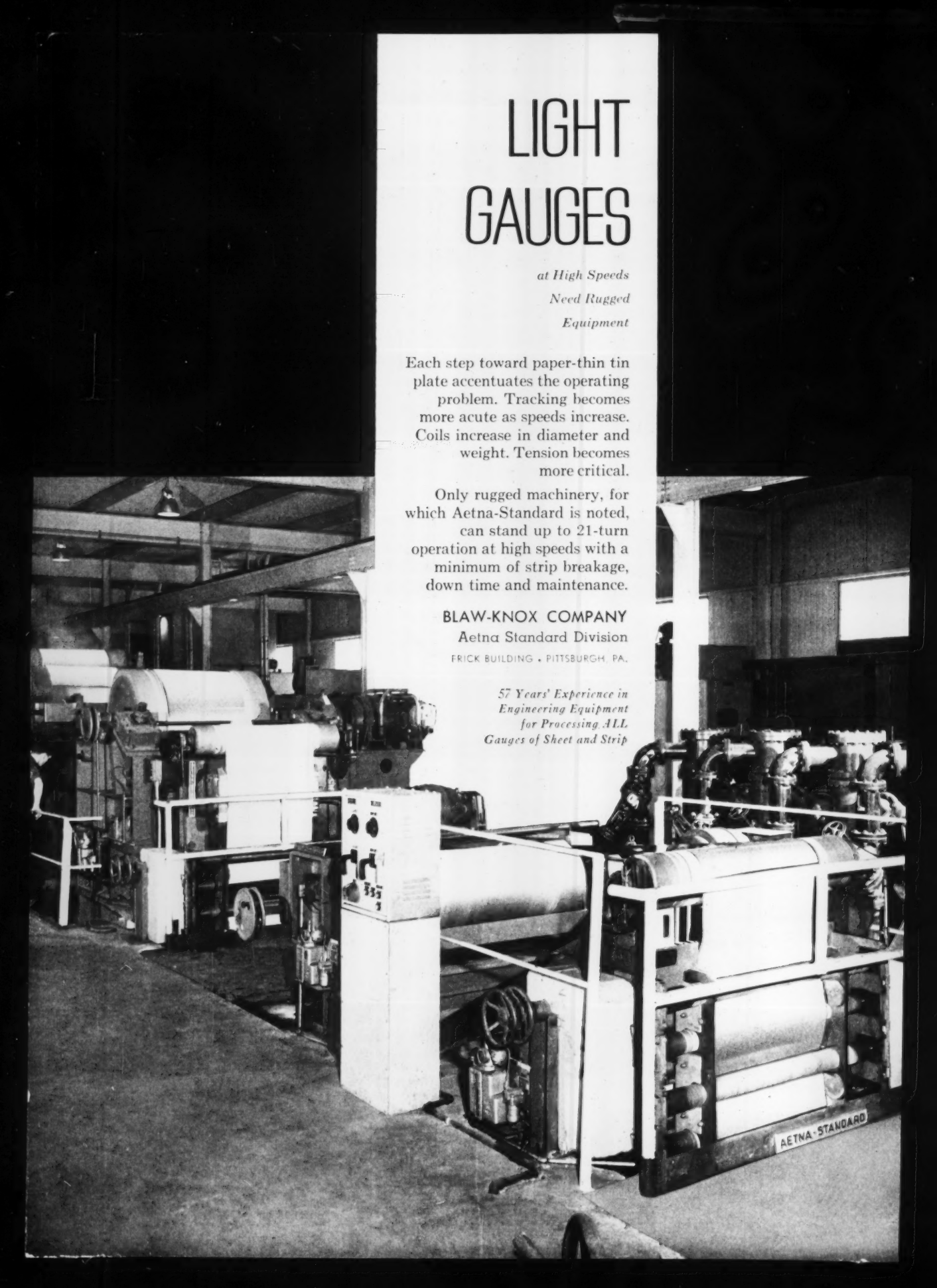

LIGHT GAUGES

at High Speeds
Need Rugged
Equipment

Each step toward paper-thin tin plate accentuates the operating problem. Tracking becomes more acute as speeds increase. Coils increase in diameter and weight. Tension becomes more critical.

Only rugged machinery, for which Aetna-Standard is noted, can stand up to 21-turn operation at high speeds with a minimum of strip breakage, down time and maintenance.

BLAW-KNOX COMPANY
Aetna Standard Division
FRICK BUILDING • PITTSBURGH, PA.

57 Years' Experience in Engineering Equipment for Processing ALL Gauges of Sheet and Strip

This Week in STEEL

The Metalworking Weekly

August 10, 1959 Vol. 145- No. 6

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Metalworking Pulse ▶

TURN

Metalworking Pulse

INDUSTRIAL PRODUCTION INDEX

	WEEK ENDED AUG. 1	PREVIOUS WEEK	MONTH AGO	YEAR AGO
(1947-49=100) Based on steel output, electric power output, freight carloadings, auto assemblies	120†	121	158	136

†Preliminary.

The big drop in STEEL's industrial production index caused by the steel strike is past. The bottom has not been reached, but from now until the end of the strike the decline will be in small steps.

Details on Page 99

U. S. PASSENGER CAR PRODUCTION

	WEEK ENDED AUG. 8	PREVIOUS WEEK	MONTH AGO	YEAR AGO
Number of units assembled	116,000*	120,916†	123,147	65,614
(Source: Ward's Automotive Reports.)	*Estimated.	†Preliminary.		

Production dropped another notch last week as American Motors Corp. began its 1959 model phaseout. Within the next two weeks, every auto plant will be involved in model changeover. A few '60s may be assembled by then.

Details on Page 96

NATIONAL STEEL INGOT PRODUCTION

	WEEK ENDED AUG. 9	PREVIOUS WEEK	MONTH AGO	YEAR AGO
Net tons (thousands)	340*	345	2,252	1,586
Index (1947-49=100)	21.2*	21.5	140.2	98.7
Percentage of capacity	12.0*	12.2	79.5	58.8

*Estimated by STEEL; comparative figures reported by AISI.

Only minor fluctuations in tonnage figures are expected for the duration of the strike. Some extensions of labor contracts are running their course but the additional tonnages lost are relatively small.

Details on Page 170

STEEL SCRAP PRICE COMPOSITE

	AUG. 5	WEEK AGO	MONTH AGO	YEAR AGO
Based on No. 1 heavy melting grade at Pittsburgh	$38.33	$38.67	$38.00	$42.00

Consensus in the trade is that the market will turn bullish as soon as mills resume production after the strike. Capacity operations are predicted for the fourth quarter. At present, prices are weak on light buying.

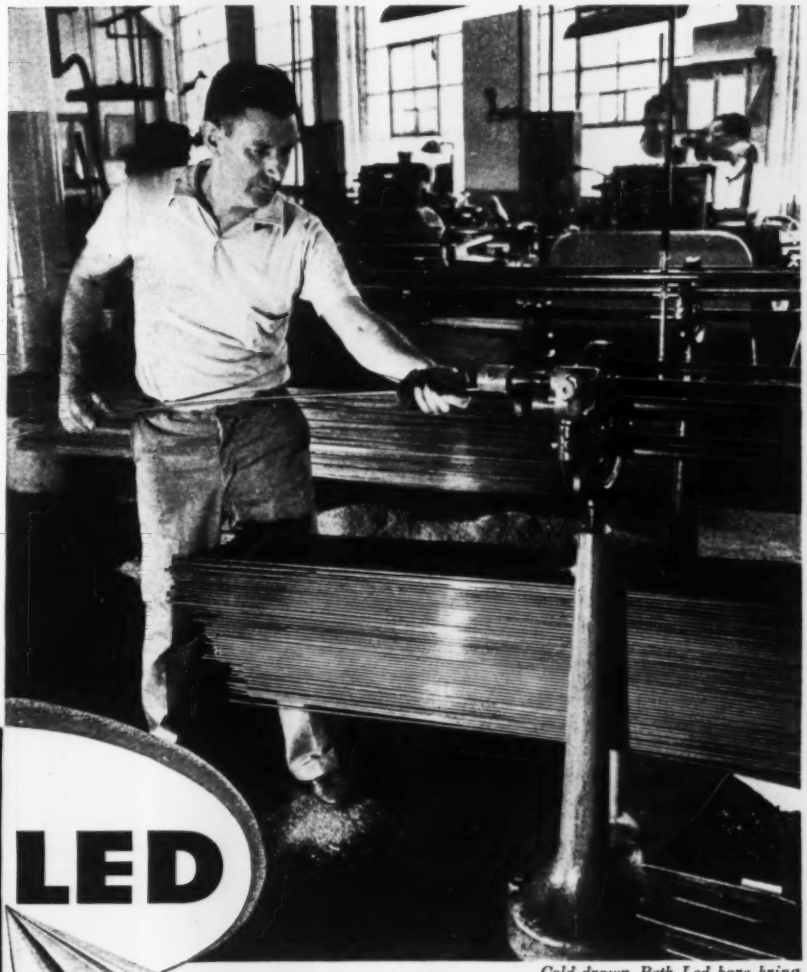
Details on Page 183

FINISHED STEEL PRICE INDEX

	AUG. 4	WEEK AGO	MONTH AGO	YEAR AGO
Based on Bureau of Labor Statistics data (1947-49=100)	186.7	186.7	186.7	185.1

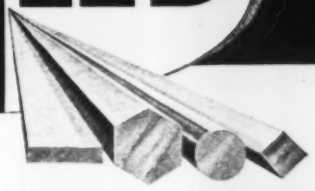
Temporarily at least, the weakening effect of heavy steel imports on the domestic steel market has completely disappeared. No major change in the price situation is expected until after a labor settlement is reached.

Details on Page 171



Cold-drawn Beth-Led bars bring greater profits to customers' screw products shops.

BETH LED



for improved machinability

Screw products shops everywhere are turning to Bethlehem leaded screw stock. And here's why:

FASTER METAL REMOVAL Leaded steel permits an increase in optimum cutting speeds from 25 to 40%—sometimes even more.

LONGER TOOL LIFE Leaded steel machines easier in every way; more pieces can be produced per tool regrinding.

SMOOTHER MACHINED FINISHES Leaded steel provides better chip control, takes closer tolerances and more accurate finishes.

Have you tried leaded steel lately?

Beth-Led is Bethlehem's new free-machining, high-sulphur carbon screw stock, the most modern leaded steel on the market. Manufactured under rigid quality controls, Beth-Led opens the way to a top quality prod uct produced at lower cost.

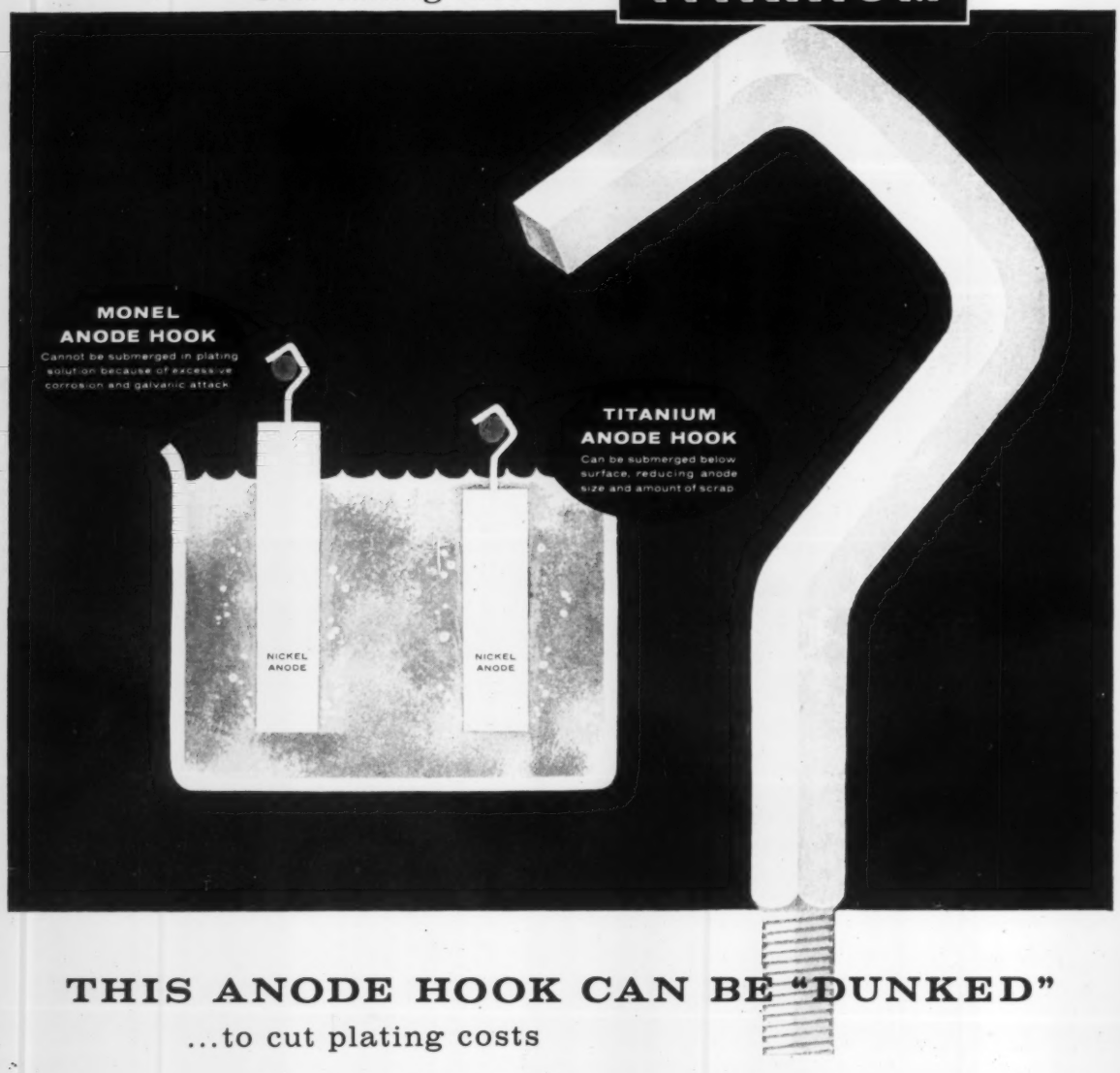
Plan now to give Beth-Led a trial. Our metallurgical engineers will gladly discuss its application to your product. As a cold-finished bar product, Beth-Led is distributed through non-integrated cold drawers.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Cost cutting ideas in **TITANIUM**


MONEL
ANODE HOOK
Cannot be submerged in plating solution because of excessive corrosion and galvanic attack
TITANIUM
ANODE HOOK
Can be submerged below surface, reducing anode size and amount of scrap
NICKEL ANODE
NICKEL ANODE

THIS ANODE HOOK CAN BE "DUNKED"

...to cut plating costs

IF YOU'RE PLATING PARTS with nickel, chromium or copper, here's a cost-cutting idea worth investigating.

The titanium anode hook illustrated above offers important advantages in highly corrosive plating applications. For example, because of titanium's extreme resistance to corrosion, the bare hook can be "dunked" in nickel plating solutions. This means you use up practically *all* of the anode—reducing costly scrap waste. In addition, the titanium hook lasts indefinitely.

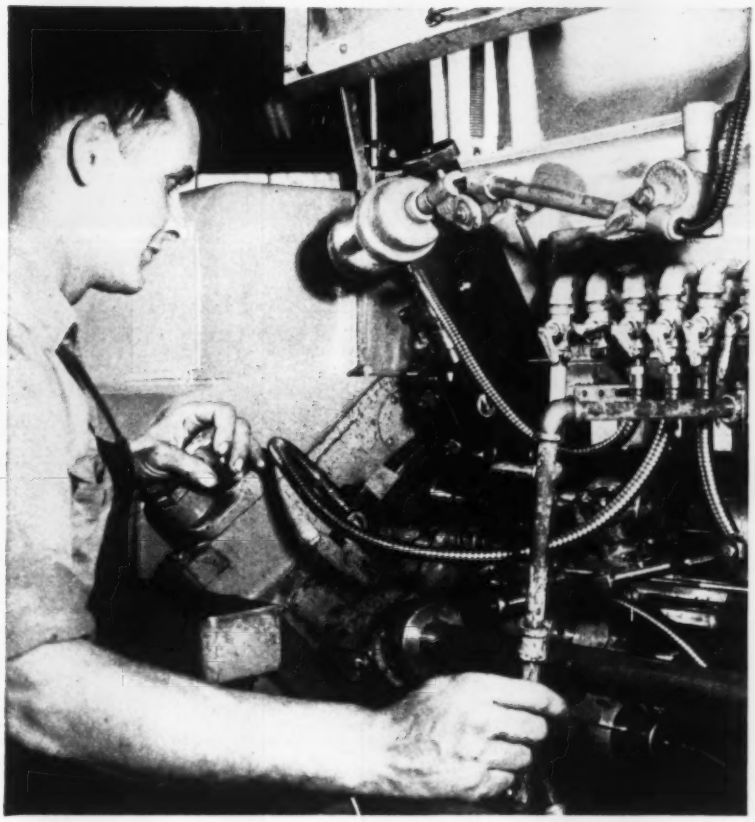
Titanium hooks, anode baskets and heating coils are now cutting costs in a number of large-scale plating applications... examples of how Mallory-Sharon's development work in titanium is paying off for industry.

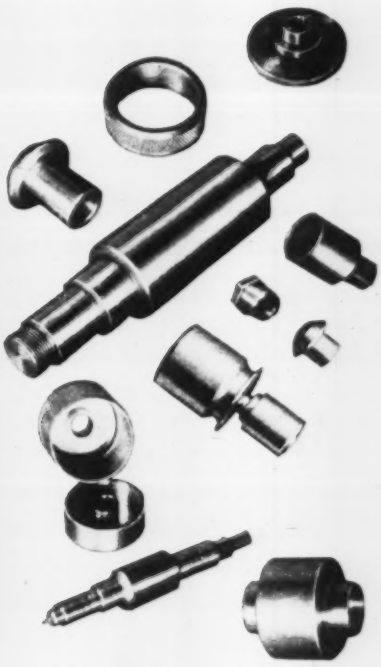
Write for Technical Data Sheet and application information on titanium anode hooks, or any other high-corrosion problems you may have. Please address: Commercial Market Development, Dept. A, Mallory-Sharon Metals Corp., Niles, Ohio.

MALLORY SHARON

MALLORY-SHARON METALS CORPORATION • NILES, OHIO

Integrated producer of Titanium • Zirconium • Special Metals





"Our Warner & Swasey 5-Spindle Automatics put us in business on small lot precision jobbing work..."

reports Troy Manufacturing Co., Welshfield, Ohio

Success of this progressive 6-man job shop has literally been founded on the ability of their 2¼-inch 5-Spindle Warner & Swasey Automatics to produce complex work accurately, in lots as small as 500 pieces with simple tooling and fast setups.

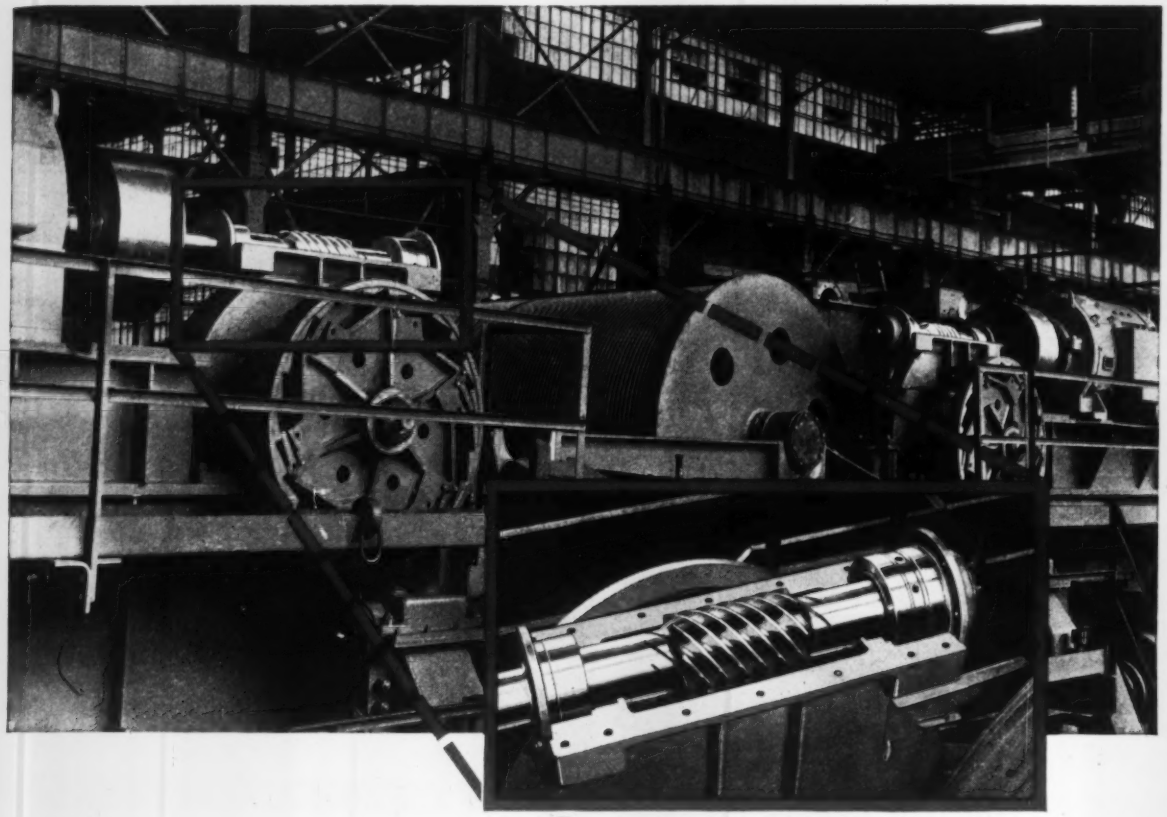
Generally accepted job shop practice precludes the use of multi-spindle operations because of the economics involved in the "set-up time—lot size" relationship. This ratio is usually quite large on conventional automatics—which eliminates them from all but the longest run jobs.

However, Troy Mfg. has found the reverse to be true in the operation of their two Warner & Swasey 5-Spindle Automatics. As Mr. Cseplo, Manager of Troy Mfg., explained, "Quick setups permit us to profitably handle small lot work, and on jobs requiring tolerances between .001" and .002" we seldom scrap a piece which I think is good multi-spindle work. We handle an extreme range of work size and materials in short runs, and the accuracy and versatility of our Warner & Swaseys are invaluable assets to a job shop operator."

Warner & Swasey Multi-Spindle Automatics can substantially cut your machining costs on small and medium lot production—as well as on longer runs. To get the complete story of how these versatile machines can profitably fit into your production picture, call in your Warner & Swasey Field Representative, today.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS ... WITH A WARNER & SWASEY



for built-in OEM drives, Cleveland custom components save space, give smoother operation

By using standardized or custom-built Cleveland Worms & Gears, machine designers overcome the frequently troublesome problem of economically providing a quiet and efficient drive in a limited space. Cleveland components are available not only in standard sets but also in special sizes and ratios. Our wide range of special worm gear production equipment places us in an unparalleled position to furnish worms and gears of special designs. We maintain a complete and perpetual master worm and hob inventory that enables ready duplication of *any* Cleveland worm and gear ever made.

Our engineering specialists will gladly give you complete information on any application where specialized worm gear know-how is required. Call them today—they're as near as your phone. Or write for Catalog 201F—it gives complete data on built-in Cleveland Worms and Gears.

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Worm Gear
Drives

The Cleveland Worm & Gear Company
3270 East 80th St., Cleveland 4, Ohio

A subsidiary of
Eaton Manufacturing Company

Affiliate: The Farval Corporation

STEEL
Servicenter

Please direct all correspondence to attention of Ed Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

August 10, 1959

Karl the Kibitzer

For a story in this issue, Tom Welsh, one of our art editors, cartooned unicyclists and tightrope walkers to illustrate and help explain some of the terms used in instrumentation. Nearby Tom's desk, sits Ed Karl, art editor for *Automation*, one of STEEL's sister publications. Ed was kibitzing Tom's layouts and quickly whipped off this version of how the whole story ended. Ed's sketch can be likened to the irresistible urge which sometimes moves people to adorn models in posters with mustaches. If you've ever had the urge, you'll understand. If you haven't, check the art in "Automatic Controls Made Easy (For Guys Who Hate Slide Rules)," Pages 130-131.

Strip for Action

One T. Humes, Pittsburgh, writes: "It appears you have the 'cast iron' head. The article in the Chicago paper describing the Queen's trip north was obviously written by a Britisher or taken from a British source. (Servicenter, July 27, p. 6) *Open cast* is British for 'strip'—the usage was correct, *'strip iron mine.'* Sharp eyed accuracy indeed. Dumkopf!"

Onery Ed took off for the library when this note came in. He was heard mumbling: ". . . no wonder the United Nations has difficulties . . ." *Peele's Mining Engineers' Handbook*, under Open Cut Mining, says: "Open cuts (open workings, open pits, open casts) are surface excavations. In coal mining they are called strippings . . ."

A letter from Walter Carroll, metallurgical engineer, Republic Steel Corp., Cleveland, contained a clipping from *Mining World Annual Review* which phrased it: "*opencast* mining."

Dear Sir or Madam Humes: You may be right, but—subsequent reference in the Chicago clipping was made to "open pit mines" so we assumed the writer goofed. If the reporter had referred to open cast mining or opencast mining, no argument.

Next time we'll check things British with J. A. Horton, our correspondent in Birmingham, England. Dumkopf, indeed. Yours truly, Onery Ed.

Letters from Charlsie

In June of this year, we began corresponding with a sprightly lady, Charlsie Vunovic, a secretary in the works manager's office at General Steel Castings Corp., Granite City, Ill.

You may recall, Charlsie was inconsolable over the demise of Shrdlu, Ed Service's predecessor, but she liked us well enough to submit 24 entries in our contest to name this column.

We got to thinking about Charlsie's contribution, so we wrote, asking her for a photo.

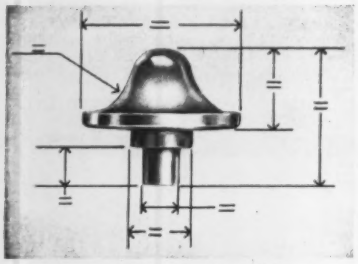
Picking up in the middle of her reply: ". . . my mother, husband, and three-year-old daughter think I am making the whole story up—especially the part about where you request my picture.

"And there's where the suggestions pour in: Bickel of the Schedule Dept. suggests I send you one of Marilyn Monroe; (we just happened to have this one, Charlsie) the assistant works manager came up with a pin-up girl on a blotter that he thought would be a good one to label 'Charlsie' and send in; but my favorite boss said he thought a picture of plain old me would be just fine (you can see why he's my favorite)! Mother also strongly urged me to send you one taken when I was 21; she thinks it's flattering—I told her that was nine years ago, and I've changed slightly since then."

Arthur Miller's wishes notwithstanding, you fellows can have your MMs, pin-up girls, and other sundry choices, we'll take Charlsie. Here she is, posed in the conference room at General Steel. Charlsie had this to say: "The picture was taken a week ago today. I still haven't changed much, so I'm sending you the one that we all liked best. You'll notice I'm trying to get in a plug for General Steel in the background. Outside of honestly loving to work here, I feel it doesn't hurt to do a bit of advertising. But my advertising is unbiased. Upon close inspection, you'll notice I'm

Manufacturers of Cold Headed Fasteners Since 1888

OVER **10** TIMES THE RATE AT **50%** SAVING IN RAW MATERIAL



Another example of how Hubbell Cold Heading produces Better Parts at Faster Speeds, at Lower Cost

THE PART:
Click Button

THE MATERIAL:
Brass

THE METHOD:
Hubbell cold heading in place of screw machining.

THE RESULT:
This brass click button was machined previously from bar stock, involving several different operations that removed nearly 50% of the total weight of the original stock . . . a wasteful, time-consuming, costly process.

Hubbell now produces essentially the same part at tremendous savings in time and material cost.

a. Production is increased from the original rate of 5.5 pcs. p.m. to cold heading rate of 60 pcs. p.m.

b. Labor, overhead and material cost has been reduced 36%.

c. The finished part is stronger, more accurate, with greater uniformity.

Hubbell Cold Heading may provide equally dramatic results for you. Whether it is presently cold headed or not, send blueprint of part or sample for analysis and estimate.

HARVEY HUBBELL, Inc. *Machine Screw Dept.*
Bridgeport 2, Connecticut

Kindly estimate on the enclosed sample (blueprint) Quantity _____

Name

Title

Company

Address

clutching a copy of my favorite weekly in my chubby little hand."

Charlsie, we're unbiased too. We cropped the photo to concentrate on you, and we even cut out the portion showing you clutching a copy of STEEL.

We'll undoubtedly be hearing from Charlsie again. In the meantime, and until National Secretary Week rolls around, we hold that Charlsie's one of the greatest secretaries going.

King Reader's Retort

In the July 13 column, we invited you, the readers, to send in your solutions to the problems raised by foreign competition. R. M. Drews, Cleveland (who asked that we don't mention his company), made this reply:

"While I don't disagree with what 'The Editors Believe,' I am afraid (your thoughts) are like wishing the Good Lord would move the moon and stars closer to earth so the boys at Canaveral could hit them . . .

"Suggesting a lower tax bite by tax revision, depreciation reform, etc., without a replacement of revenue would be political suicide . . .

"At the turn of the century, when labor was a dime an hour and you could get the best carpenter or bricklayer for two bits an hour (and no double time), McKinley had to resort to restrictive tariffs to protect our then high wage structure. Of course, they shot him. While tariffs may not be the whole answer, they sure help . . ."

Research on Research

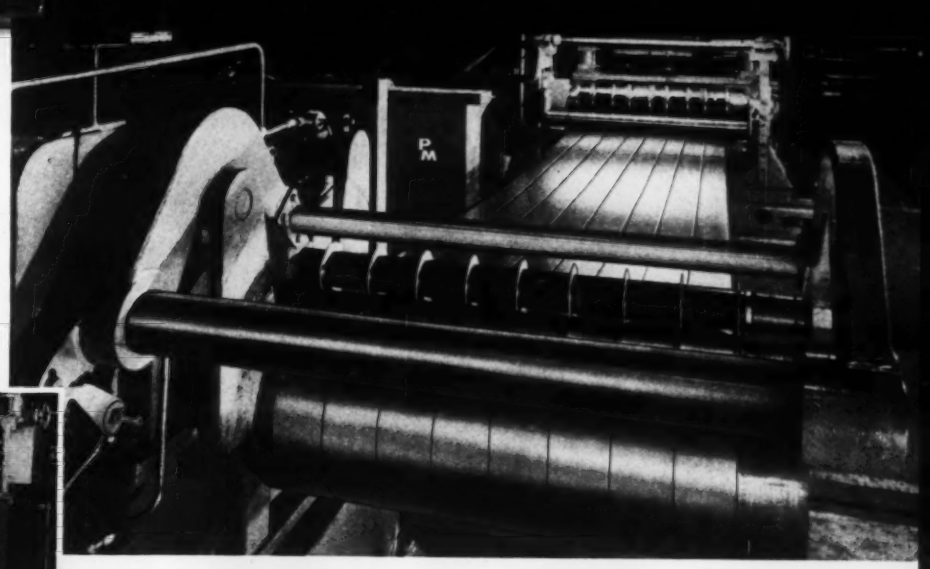
This fellow decorates each Program for Management article in STEEL and the crosshairs symbolize our editors taking a bead on the problems confronting our readers. Next week you'll see him in Chicago Editor Bill Dean's article, number seven in this year's series, "Increasing Research and Development."

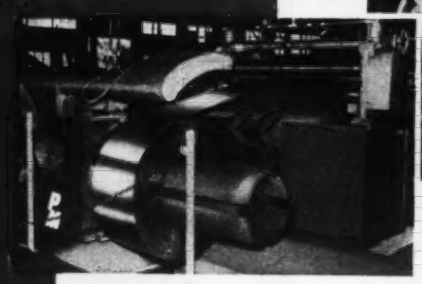
Bill did ten major interviews and obtained comments from more than two dozen managers while researching the topic. Here are some highlights from his notes:

There's evidence that R&D is no longer a fenced off area reserved for "thinkers" only . . . R&D's batting average can be boosted only as co-ordination between other managerial functions improves, such as between engineering and marketing . . . Too many R&D jobs are successful projects but commercial failures . . . How do you provide incentives for R&D people? How about the problems posed by the young vs. the older researcher?

Much emphasis has been placed on improving efficiency in manufacturing, purchasing, and other functions. Here's a chance to get ideas about boosting efficiency in R&D.

PM slitting lines are designed for efficiency. This complete, highly automated PM line in a warehouse handles a variety of metals — steel, stainless steel, aluminum, etc. The picture shows one of the time saving features of the line, a PM overhung arm separation device, used instead of heavy, individual large diameter discs.





PM uncoiler with a peeler that feeds into the flattener without manual handling — this device provides a safer, faster operation on this line, which handles gages up to 3/16", widths to 48", and coils as heavy as 30,000 lbs.

To get the kind of Slitting Line YOU need, get a P/M PRODUCTIONEERED* LINE

PM lines are built to fit the user's needs. To survey your needs, and determine the best answer for your requirements, make use of the first step in *PM Productioneering**, a talk with the PM man.

You will learn from him that PM Productioneered lines include heavy duty equipment (to handle up to ¼" gage steel); lines designed for lighter gages down to .002"; lines that handle a variety of metals including steel, stainless, aluminum, brass, copper; lines for a full range of coil weights up to largest handled by mills . . . Some are highly automated. Some are specially designed to fit difficult layout situations in crowded plants. Component parts of these lines are standard, but the flexibility of Productioneering tailors each line to the specific situation.

Flexibility in meeting individual needs makes PM lines differ, but PM Productioneering puts one common denominator into all PM products—maximum profits for the owner. Get in touch with a PM man today — there's no obligation.

Production Machinery Corporation
Mentor, Ohio

PM automatic edge control guides, .004 strip to slitter without edge damage on this light gage stainless line.

Automation in upending, banding, and downlaying coil saves time and dollars.

* **PRODUCTIONEERING** is the P/M way of working so engineers who supervise equipment designing have first-hand knowledge of problems encountered by sheet and strip processing line users. In working with P/M you work with responsible engineers who apply their skill to solve your problems.

P/M PROCESSING EQUIPMENT INCLUDES:

- Pickling Lines
- Slit Coil Banding Equipment
- Shearing and Cut-to-Length Lines
- Grinding and Scouring Lines
- Coil Build-up and Inspection Lines
- Vacuum Handling Equipment
- Continuous Lines for Annealing, Coating, Grit Blast Cleaning, Leveling and Miscellaneous Sheet and Strip Processing.

P/M

Steel Garage Door Made of Republic Electro Paintlok is Backed by Exclusive 5-Year Warranty!

"Berry Doors are guaranteed free of defects in material and workmanship. This warranty covers all parts and components for five full years after original installation."

This is the actual warranty offered by Berry Door Corporation, Birmingham, Michigan – a guarantee that is *exclusive* in the steel garage door industry.

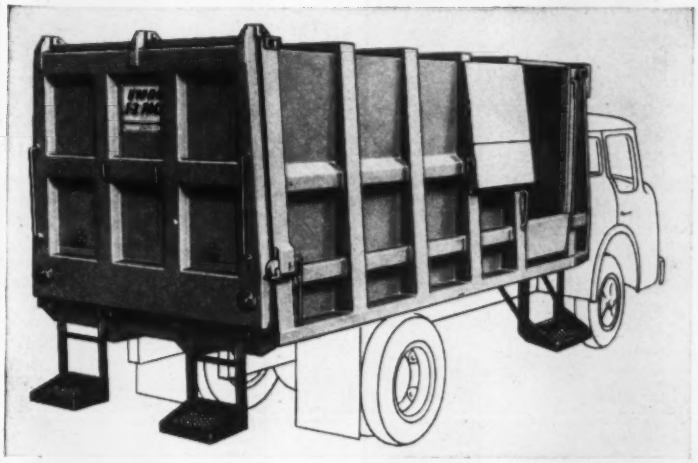
How can the Berry Door Corporation back up its products so unequivocally? One reason is the fact that they are fabricated from Republic Electro Paintlok Steel Sheets!

Electro Paintlok Sheets are strong and rigid—only steel itself provides the *strength* of steel. A pure, uniform coating of zinc, applied by electro-galvanizing, provides extra resistance to corrosion, even if the surface of a Berry Door should be scratched or abraded.

After the zinc is applied, Republic Electro Paintlok Sheets are treated chemically, giving them an inert, finely crystalline, non-metallic phosphate coating which is integral with the zinc, and absorbent in character. When a good grade of paint is applied, this coating grips the paint with thousands of tiny teeth that never let go—provides greater durability and beauty for steel doors or other products fabricated of Republic Electro Paintlok.

In addition to these customer benefits (which make products more salable), Electro Paintlok provides a number of important advantages for the manufacturer. It may be stored for extended periods, under approved warehousing conditions, without loss caused by rusting. It increases die life, and permits faster fabrication, with correspondingly lower production costs.

For additional details on Republic Electro Paintlok Steel Sheets, and the advantages they can bring to your particular application, contact your Republic representative now. Or mail the convenient coupon at far right.



REPUBLIC HIGH STRENGTH STEEL SOLVES WEIGHT PROBLEMS in *Hydro E-Z Pack* enclosed truck bodies, manufactured by Hercules Galion Products, Inc., Galion, Ohio, for haulers of refuse and garbage. Weight savings made possible by strong, tough, Republic "50" High Strength Steel allow *E-Z Pack* unit to be carried on a chassis as small as that of a two-ton truck. Reduced weight also permits increased payload—fewer trips to the dump. At the same time, High Strength Steel stands up easily under heavy compressive force of packer blade and allows tight compaction of loaded materials. High resistance to the corrosive action of refuse, as well as to the abrasive effects of cans, crates, tree limbs, and other materials, assures long, dependable service. Find out how Republic High Strength Steels can pay off in your application. Mail coupon for further information.

SECURE HOLDING POWER where it's needed most is provided by Republic Nylok® Fasteners, used by Roberton Manufacturing Company, Chicago, Illinois, in Twin Power Riding Mowers. Special nylon insert assures positive locking, maximum holding power—even under severe vibration. Insert in Republic Nylok Fasteners is unaffected by age or cold, has high resistance to heat. For further information, mail coupon.

STRONG, DUCTILE YET TOUGH REPUBLIC STEEL WIRE is available in almost any gage and physical range for almost any wire product use you can think of. The concrete reinforcing specialties above are good examples of "imagineering" in wire. Uniform quality of Republic Wire makes easy, exact forming possible no matter how difficult the design. Whatever your wire problem, Republic Wire Metallurgists will help you. Mail coupon.

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World's Widest Range of Standard Steels and Steel Products

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Please send additional information on the following:

☐ Electro Paintlok ☐ High Strength Steels
☐ Manufacturers' Wire ☐ Nylok Fasteners
☐ Have a Wire Metallurgist call

Name _____ Title _____

Company _____

Address _____

City _____ Zone ___ State _____

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Want to know why Cleveland-Northeast Ohio is the best location in the nation? No one can tell you better than our Area Development experts. Call or write, and night or day they'll be on their way to you with plant location studies, market analyses, available building and industrial site surveys.
Call Richard L. DeChant, Manager, Area Development Department, The Cleveland Electric Illuminating Company, Room 410, The Illuminating Bldg., Cleveland 14, Ohio.
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CALENDAR
OF MEETINGS

Aug. 10-13, Society of Automotive Engineers: National west coast meeting, Hotel Georgia, Vancouver, B. C. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Aug. 18-21 Western Electronic Show and Convention: Cow Palace, San Francisco. Information: WESCON, 1435 S. La Cienega Blvd., Los Angeles 35, Calif.

Aug. 19-29, National Screw Machine Products Association: Sales conference, Wade Park Manor Hotel, Cleveland. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

Aug. 31-Sept. 2, Metallurgical Society of AIME: Institute of Metals Division's conference on semiconductors, Statler-Hilton Hotel, Boston. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

Sept. 13-17, Pressed Metal Institute: Annual meeting, Stanley Hotel, Estes Park, Colo. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold A. Daschner.

Sept. 13-18, American Chemical Society: Fall meeting, Convention Hall, Atlantic City, N. J. Society's address: 1155 16th St. N.W., Washington 6, D. C. Executive secretary: Alden H. Emery.

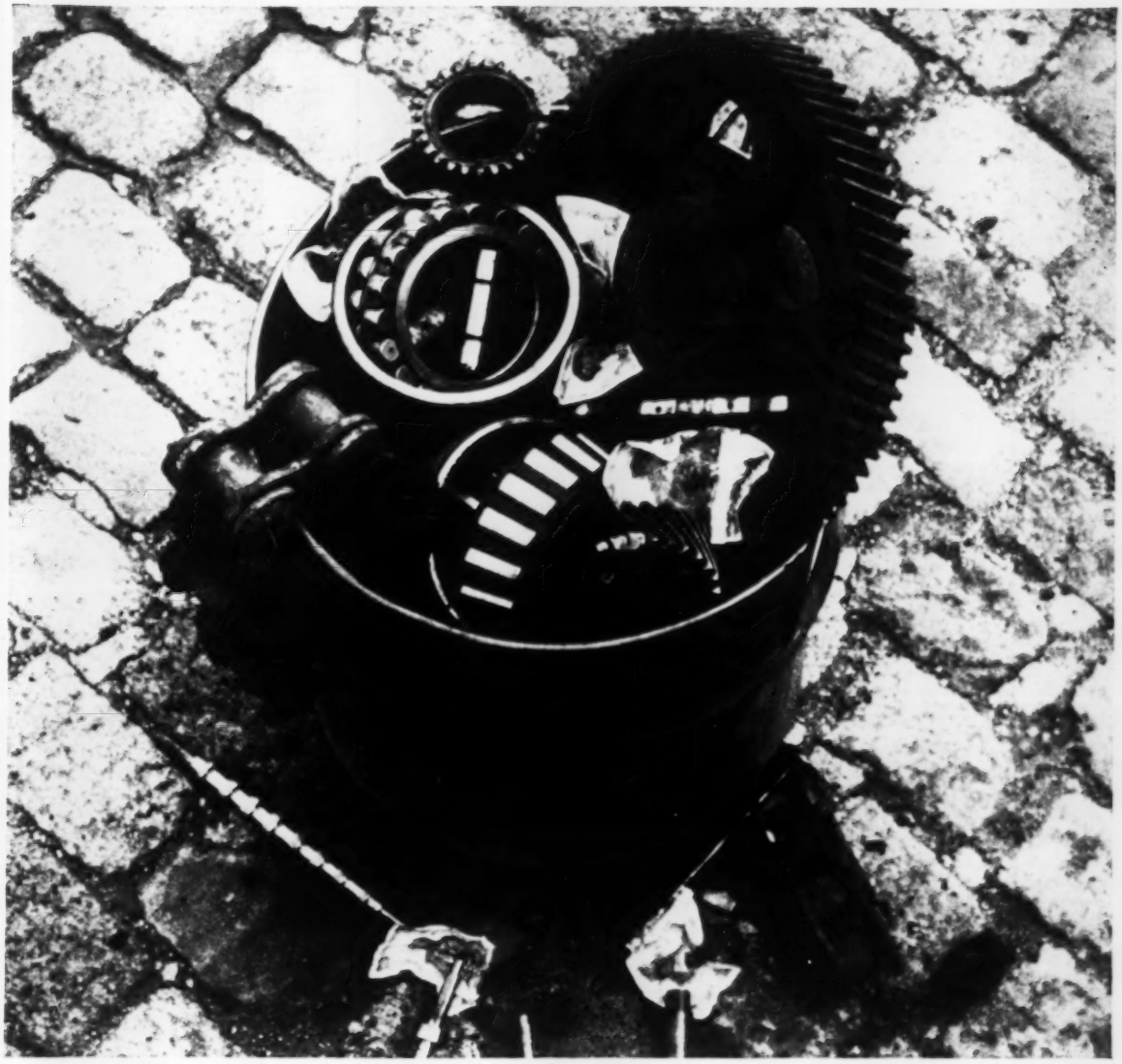
Sept. 14-17, American Mining Congress: Metal mining and industrial minerals convention, Denver. Congress' address: Ring Bldg., Washington 6, D. C. Executive vice president: Julian D. Conover.

Sept. 14-17, Society of Automotive Engineers: National farm, construction and industrial machinery meeting, production forum, and display, Milwaukee Auditorium, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Sept. 16-17, American Die Casting Institute: Annual meeting, Edgewater Beach Hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

Sept. 16-18, National Industrial Conference Board: Marketing conference, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Sept. 17-18, American Society of Mechanical Engineers: Engineering management conference, Statler-Hilton Hotel, Los Angeles. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.



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Texaco Inc., 135 East 42nd Street, New York 17, N.Y., Dept. S-110.

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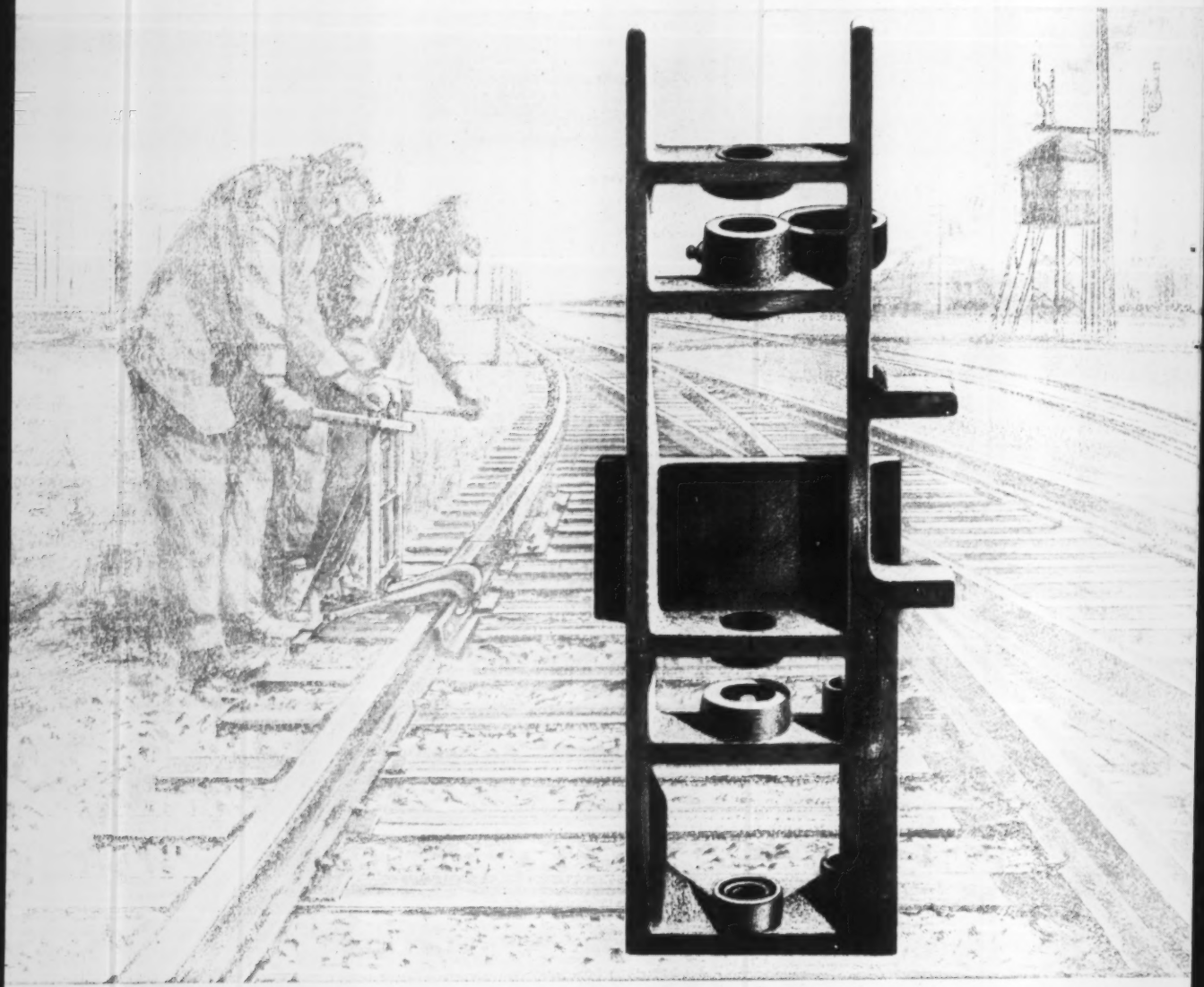
How the Foundry Industry serves America . . . #2 of a Series



SINGLE IRON CASTING REPLACES WELDMENT . . . REDUCES COST BY 66⅔%

This power track drill frame was originally produced as a weldment. It required cutting, positioning, assembling, welding and inspecting 23 separate parts. It was a major manufacturing headache in every way, and the scrap ran high.

Foundry engineers redesigned the part as a one-piece malleable iron casting at one-third the cost, plus additional savings in final machining operations.

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Facts from files of Malleable Founders Society

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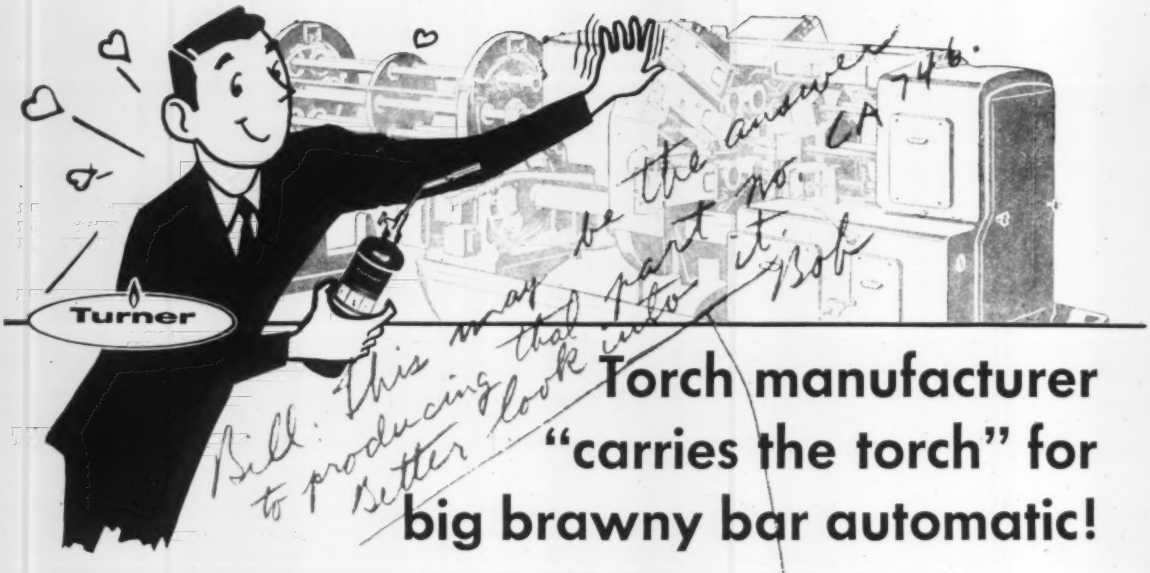


Torch manufacturer "carries the torch" for big brawny bar automatic!

Growth of a company from the founder's first fond dream to a leading place in the industry is a matter of continuing product improvement, sound management, ever-increasing efficiency, keeping pace with changing times. Read what a line of machines named Greenlee means to a company named Turner . . . and why, out Sycamore-way, they "just love those Greenlee Bar Automatics" . . .

The Great Fire of 1871 struck and scarred Chicago the very same year that enterprising Edward S. Turner "hung out the shingle" at 4 LaSalle Avenue and proclaimed to one and all that The Turner Brass Works was ready for business.

It's a long way from the Horse Age to the Age of H-Power . . . 1871 to 1959. A whole way of living changed, new products came to the fore. Alert, trend-conscious Turner kept pace with the advancing times, moved the factory to Sycamore, Illinois in 1906 . . . expanded its operations steadily until today the Turner Corporation spans 100,000 square feet of factory space, and turns out products ranging from propane torches to plumbing fixture fittings—blow torches to diesel engine starting aids — camp cook-stoves and lanterns to furnaces and furniture hardware.

Along that route Turner continually met the old familiar problem: *How to get high-speed production and maintain top quality.*

That's where Greenlee enters the picture, and the Case of the Propane Torch is a typical example. It's a "How-They-Dunit" that may hold eye-opening suggestions for some of *your* production problems.

Turner's Propane Torch suddenly became a "hot" item — hot as its glowing tip. An expanding nation-wide need for it in home and shop at length blossomed into an enormous increase in demand. The order went out: "Turn 'em out faster — but keep quality up — keep cost in line." How to do it was the question.

Turner management launched an exhaustive investigation of top-rated production machines on the market. They probed, tested, ran trial runs. Eventually they found a machine that seemed to do everything they asked. It took 9/16" round brass stock, gave it a merry whirl — 298 surface feet per minute on stock diameter—2029 revolutions per minute.

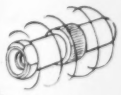
Quality tested consistently high, rejects were held to a minimum, a complete operation was eliminated, as the husky Greenlee Bar Automatics "rolled 'em out" with the tireless gait of a 'round-the-clock marathoner.

That's when a long and happy association began. For shortly thereafter, the Turner P.A.'s signature was on a purchase order for a battery of Greenlee Automatics with special attachments.

A look at the Job Progress schedule will give you an idea of how efficiently they tick off a 6-stage operation on mixer tubes:

1st Position:
The big Greenlee Cam-Feed 1-5/8" Six-Spindle Bar Automatic uses a 1" tool slide stroke with .0063 inch feed on the endworking tools. Stock is fed out to length during indexing, spot-drilled, knurled (using a standard plunge-type knurl holder and a two-roll roller rest)

2nd Position:
The mixer tube is faced by a knee turner while a .277 inch diameter drill, mounted on a high-speed drilling attachment, drills to depth.



3rd Position:
Outside diameter is sized by a standard dovetail form tool. A .187 inch hole is drilled partway, as a two-roll roller rest supports the part.

4th Position:
Using a standard milling attachment mounted on the tool slide, the two parallel flats are milled. (Attachment consists of two milling cutters mounted on a keyed arbor in the milling head). Milling head rotates at the same r.p.m. as the workpiece; internal gearing in the attachment rotates the milling cutters at proper speed for the milling cut.

5th Position:
The .187 inch hole is drilled to depth while a standard cut-off tool breaks down for cut-off.

6th Position:
A 5/16" — 27 thread is tapped, and the part is cut off.

FINAL SCORE:
580 high-quality mixer tubes per hour at gross production rate. One complete operation eliminated. Rejects at an all-time low. . . . No wonder, out Sycamore-way, they "just love those Greenlee Bar Automatics" — big — brawny — and *bears for the jobs where you've got to keep your quality reputation as you keep up with market demand.*

Question:
Have *you* looked into Greenlee, lately, for quality on a production basis?

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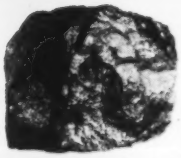

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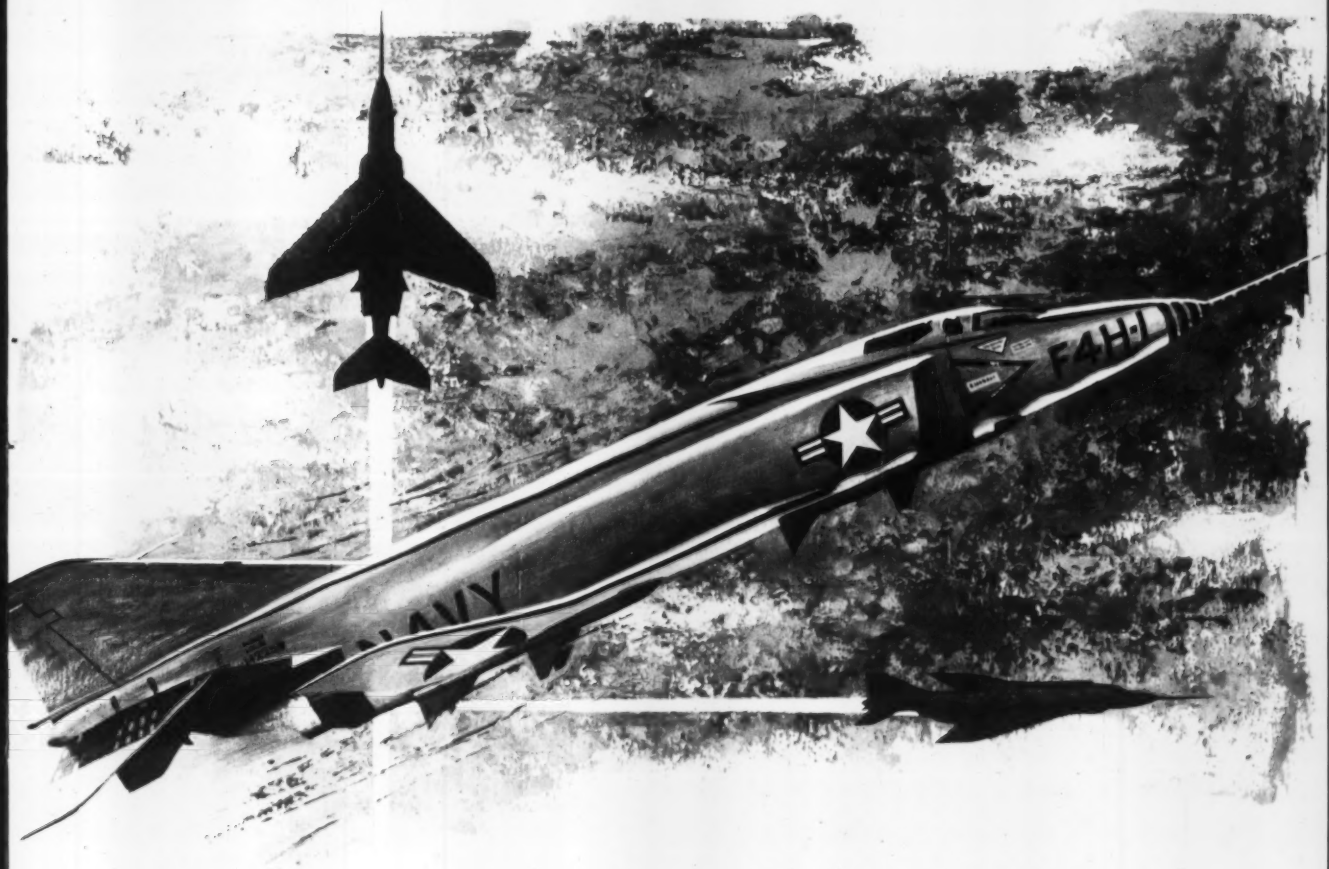


The F4H, a U. S. Navy fighter plane that flies at better than twice the speed of sound, is built by McDonnell Aircraft Corp., St. Louis, Mo.

Titanium aircraft parts creep-formed with Bethlehem Cromo-High V tool steel

Titanium skin surfaces and titanium alloy rib sections for this supersonic fighter plane are creep-formed in dies made of Bethlehem Cromo-High V tool steel. It takes a fine grade of hot-work tool steel to handle this exacting job. The steel dies are heated to between 1000° and 1200° F in order to speed the forming operation. After the titanium part is forced into contour, the heat also serves to stress-relieve the formed section.

Here's one way we know all Bethlehem tool steels are sound

Ultrasonic sound waves, pitched so high you can't hear them, penetrate every inch of the Bethlehem tool steel billet you see here. The waves, relentlessly searching out any possible inner defects, are reflected on a screen. When the Bethlehem inspector gives his OK, you can rely on the soundness of every bar rolled from the billet.

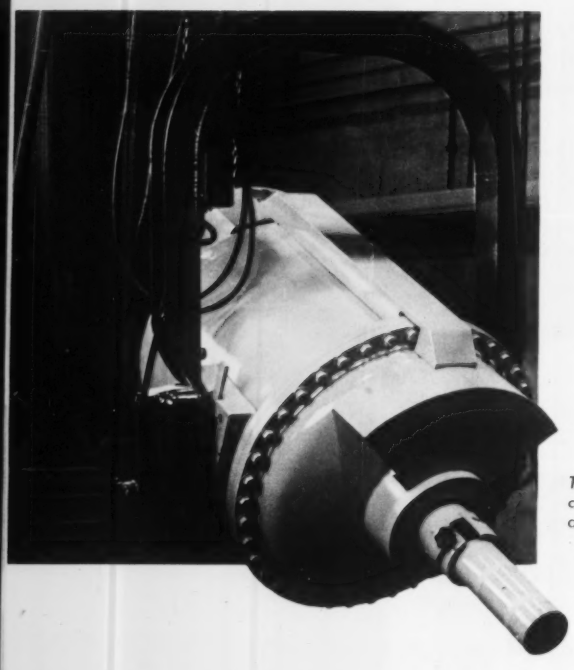
Today's steels require higher standards of inspection than ever before. We regularly perform both destructive and non-destructive tests, depending on specifications. Careful inspection, using the most modern testing techniques, is your assurance that Bethlehem steels will do their job.

BETHLEHEM STEEL

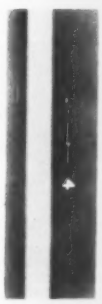
Probing welds of missile mast with 250,000 volts

There's not a chance that an unsound weld will escape the penetrating eye of this powerful X-ray machine. Here the X-ray probes into welds for component sections of a tower mast for a Titan missile. The mast, which supports fuel injection apparatus, must withstand the extremely high stresses and forces of a missile launching.

Radiography, like the ultrasonic test, is valuable in examining subsurface structure. The quarter-of-a-million-volt portable X-ray machine, shown at the top of the page, helps to assure that welds made in Bethlehem's shops are completely sound.

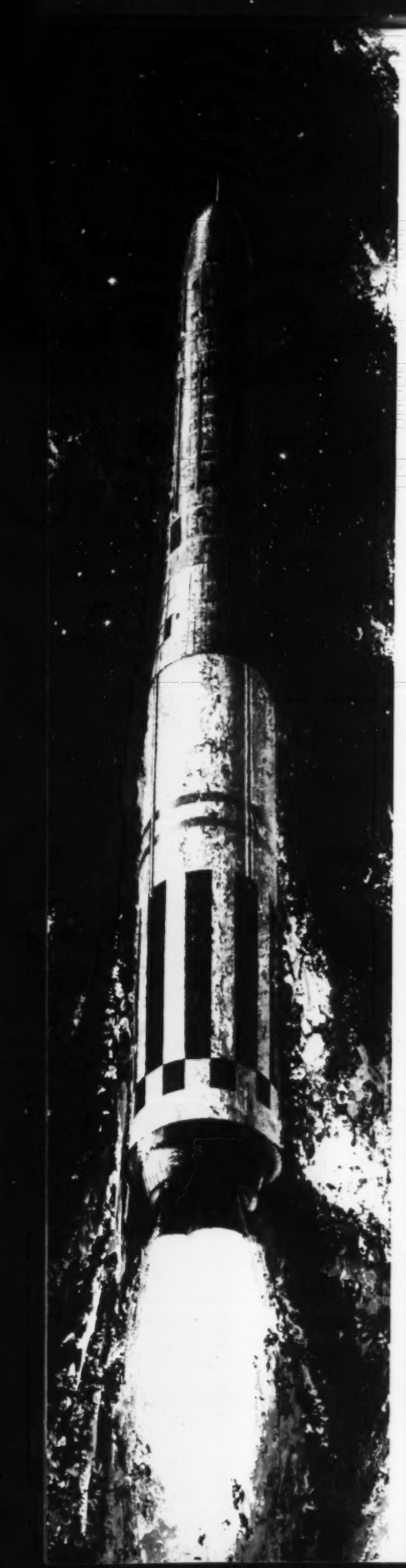


This 1,000,000-volt X-ray machine can penetrate several inches of steel, and is a valuable tool in the inspection of Bethlehem castings.



This X-ray negative of a weld made on the missile tower mast shows that the metal is sound.

BETHLEHEM STEEL



"Flow lines" are controlled by die design to impart highest strength and toughness where greatest stresses will occur.

Magnetic tests check strength of aircraft-quality drop forgings

This Bethlehem drop forging is a wing-to-fuselage fitting for a jet aircraft that flies at speeds approaching twice the speed of sound. The 109-lb forging must stand intense vibratory and torsional stresses. Aircraft-quality steels call for rigid control and careful inspection at every stage of production.

Magnetic testing indicates both surface and near-surface discontinuities. Magnetic powders, applied wet or dry to the magnetized forging, concentrate at any point of flux leakage, revealing any minute cracks, seams, laps, tears, etc. Experienced Bethlehem inspectors are key members of the production team; when they complete their series of careful examinations, we know that every drop forging we ship is sound, uniform, and made to specifications.

"Magnaglo" inspection is one of a series of tests to make sure no defects are present. Bethlehem makes drop forgings ranging from one to 250 lb in size.

BETHLEHEM STEEL

Bethlehem engineers will work with you on your steelworking problems

New research center underway at Bethlehem

Work is well underway on the new research laboratories in Bethlehem, Pa., which will provide the most modern facilities for work in mechanical engineering, process and physical metallurgy, mechanics, chemical engineering, ceramics, chemistry and physics, including nuclear studies.

Bethlehem Steels and Specialties

Here is a partial list of steels and specialty products in the Bethlehem line:

BARS AND BILLETS:
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Concrete reinforcing bars
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A grade for every job

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ROD AND WIRE: General and special-purpose types
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COLD-FORMED SHAPES

PALLET RACKS

WELDMENTS: Frames, tanks, housings, vessels

RAILS: Tee, crane, girder

CASTINGS: Carbon, alloy, and stainless steel
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Fritz Jensen, President, Southern Screw Company

Fritz Jensen picked North Carolina for his operation because the surrounding furniture industry provided a ready made market for metal fasteners. With one associate he trained 14 local people and went into production of wood screws in 1946. Production increased rapidly because trainees were quick to acquire needed skills.

Accessibility extended distribution. North Carolina is within overnight distance of all the great metropolitan centers from Boston south, and west to the Mississippi and Great Lakes. Today seven kinds of fasteners are being made at Southern Screw. An inventory of one and one-half billion fasteners is maintained.

Number of employees has increased in 13 years from 14 to 800— a growth percentage of over 5614%.

Southern Screw Company is in the forefront of North Carolina's metal working industry which ranges from components to complete assembly.
Metal working industry investment for new and expanded plants in North Carolina during the last three years is in excess of $159,000,000.

For prompt and confidential plant location information contact Wm. P. Saunders, Director, Department of Conservation and Development, Raleigh, North Carolina.

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that gives you the part you need

When you buy forgings or stampings from T&W, an entire team swings into action. These experts make sure you get what you need on time. This coordinated teamwork is a part of *T & W Technique* which gives you forgings and stampings which usually cost you less at your point of assembly.

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On the 70-inch axle shown at left, T & W Technique helped to meet these requirements: The overall length tolerance is held to 1/8-inch; there is no draft on the upper and lower surfaces of the spring pads (A); tops of the spring pads are parallel within 1/16-inch; knuckle pin bosses are in vertical alignment within 1/32-inch.

DEEP DRAWN STAMPINGS like this radiator grill are produced by T & W's Stamping Division. Stampings requiring draws up to 16 inches are produced in dies up to 60 inches long by 40 inches wide.

• • •

Write for 20-page book, "Transue & Williams Challenges the Future" explaining how T & W Technique produces forgings & stampings that cost you less at your point of assembly.

FORGINGS & DEEP DRAWN STAMPINGS

TRANSUE & WILLIAMS
ALLIANCE, OHIO, U. S. A.

Name _____ Title _____
Company _____
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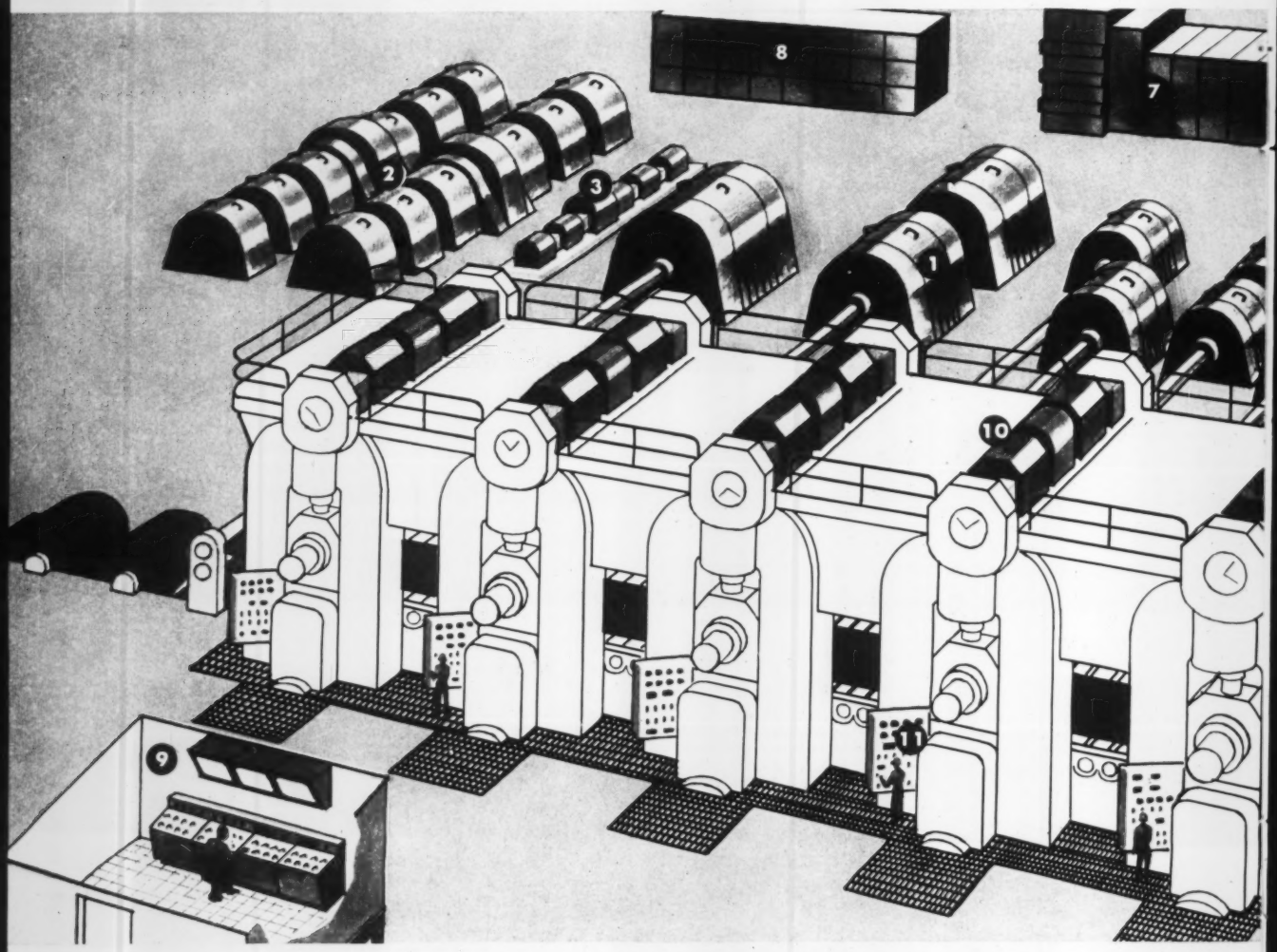
General Electric's new program for Automation through Modernization will help you . . .

INCREASE YIELD, MODERNIZE FOR PROFITS



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2. **Motor-generator sets** provide reliable d-c power to main drive motors.
3. **Auxiliary m-g sets** provide precise d-c power to screw down motors.
4. **Main mill control** utilizes most modern control techniques for maximum reliability while performing the complex functions of automation.
5. **Automatic gage control** using quick-response DIRECTO-MATIC static control and RAYMIKE 600 X-ray thickness gage combines extreme accuracy with great reliability over long periods.
6. **G-E 309 data logger** keeps accurate record of gage. Records all production information important to business functions of the mill.
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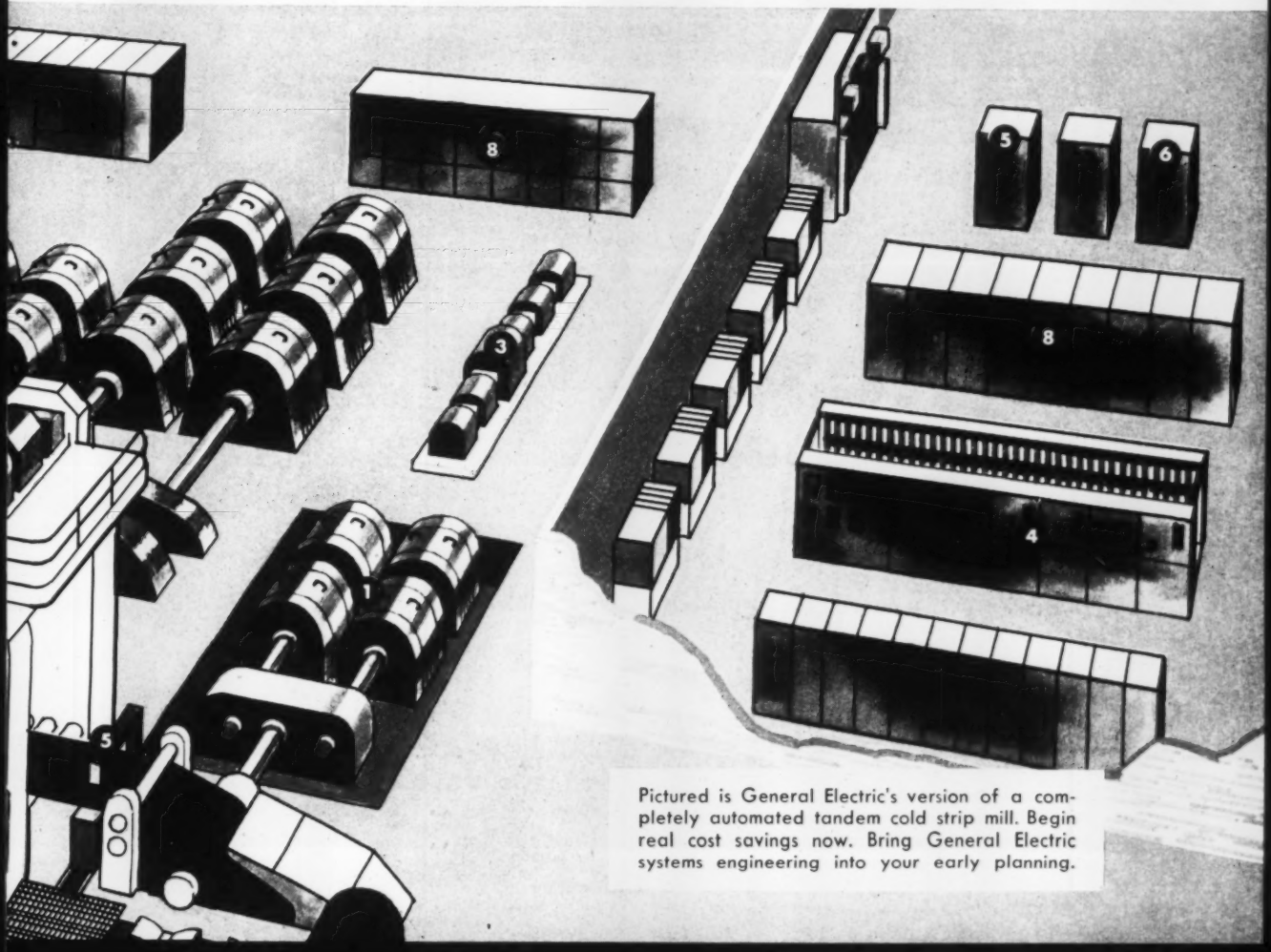
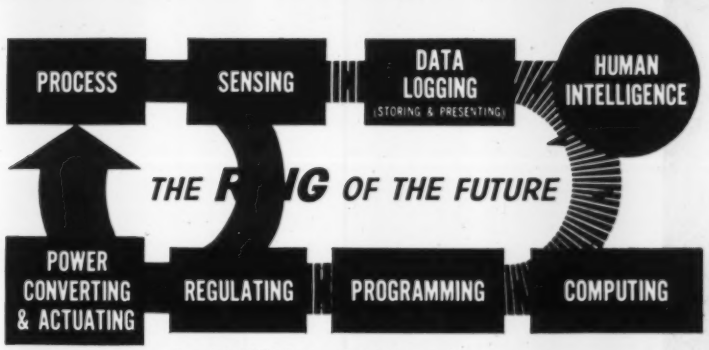
8. **Metal-clad switchgear** combines maximum reliability and safety with minimum of maintenance in distribution of power to all mill functions.
9. **Control console** with closed-circuit TV gives one operator control of all high-speed rolling operations and visual contact with all remote and inaccessible mill functions.
10. **MD-600 motors** drive stand screwdowns, provide instant response and minimum of maintenance to most vital mill function.
11. **Individual stand control** allows presetting of stand speed relationships and mill openings during threading operation.

You can completely automate your tandem cold mill now . . . through a logical, step-by-step program of modernization. General Electric engineers, with more than 25 years experience in development and application of electrical systems for tandem cold mills, will blend available, advanced equipment and the latest technology into a coordinated system for you. This will assure you uniform thickness, low-cost efficient operation, maximum mill utilization plus increased yield. Begin planning for low-cost automation through modernization now. Call your nearest General Electric Apparatus Sales Office today.



Pictured is General Electric's version of a completely automated tandem cold strip mill. Begin real cost savings now. Bring General Electric systems engineering into your early planning.

THE "RING OF THE FUTURE" KIT IS GENERAL ELECTRIC'S GUIDE TO AUTOMATION THROUGH MODERNIZATION. ***Write for your kit today.***



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TO: SECTION 804-4
GENERAL ELECTRIC COMPANY
SCHENECTADY 5, NEW YORK

Please send me G.E.'s "Ring of the Future" kit.

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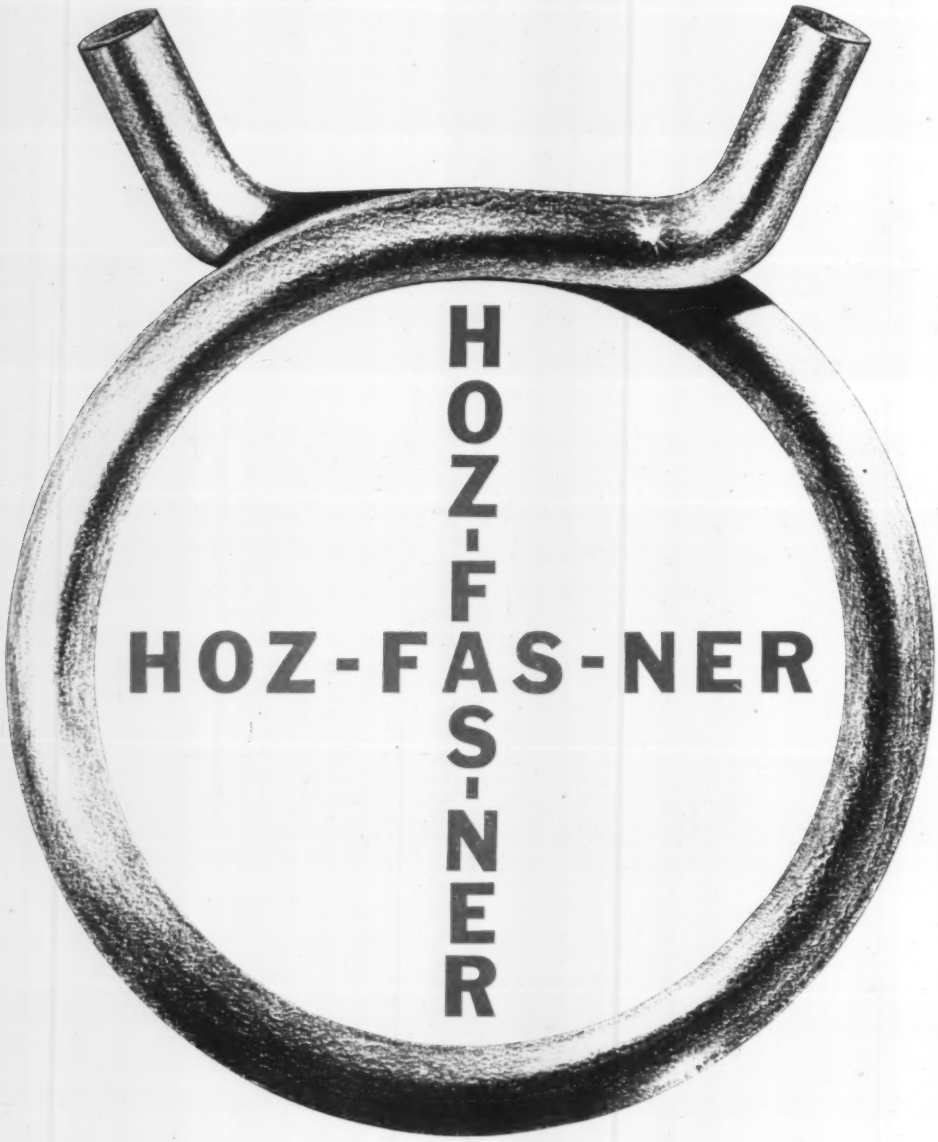
Automation Through Modernization

GENERAL ELECTRIC



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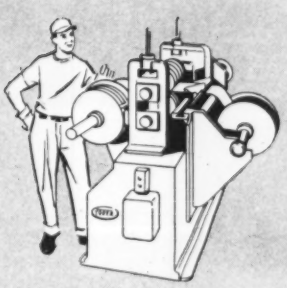

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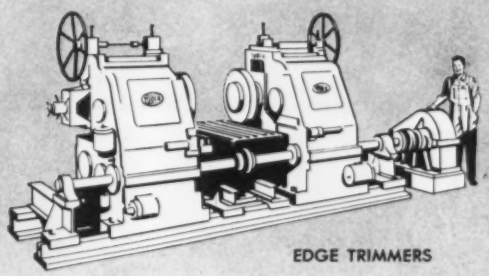
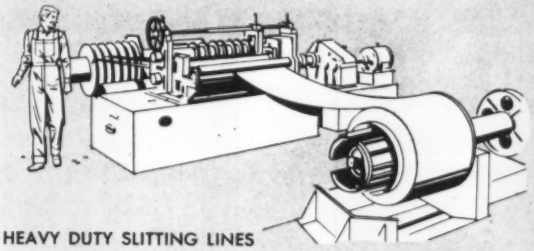


EDGE TRIMMERS



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To help meet the demands of tight production schedules, YODER Slitters reduce mill-width stock quickly and economically to desired widths. If your needs are as low as 100 tons per month, time and manpower savings alone will offset the cost of your YODER Slitter in a matter of months, while reducing basic inventories. Compactly designed, standard YODER Slitters are built to handle standard coil widths... completely engineered lines for special requirements.

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YODER also makes a complete line of Cold Roll-Forming equipment and Pipe and Tube Mills. To profit from YODER'S years of engineering and service experience, contact your local YODER representative or send for the fully illustrated descriptive, YODER Slitter Manual; it's yours for the asking. Write to

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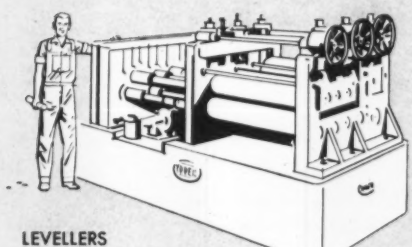
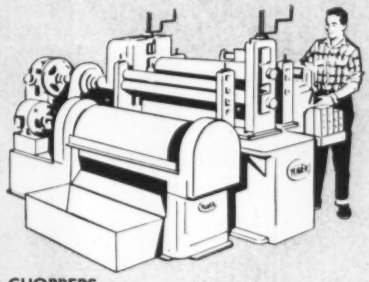
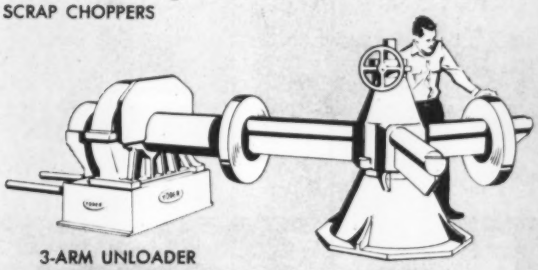


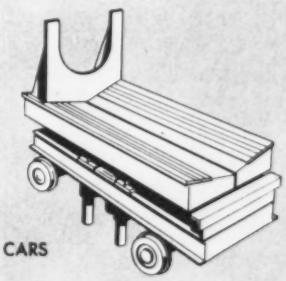
LEVELLERS



SCRAP CHOPPERS



3-ARM UNLOADER



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Phosphate Coated
MUSIC WIRE

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A trial order will convince you.

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STEEL

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Please send me a copy of your new Book 2779 on LINK-BELT Pre-Bilt sectional belt conveyors.

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Splatter of hot solder cracked his left bifocal ***heat treated*** safety lens. Result: Lens took punishment, eye saved.

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Piece of broken drill struck left lens of safety goggles, continued up to roof of building "singing like a bullet". Result: Eye saved.

Always insist on the AO Trademark on lenses and frames

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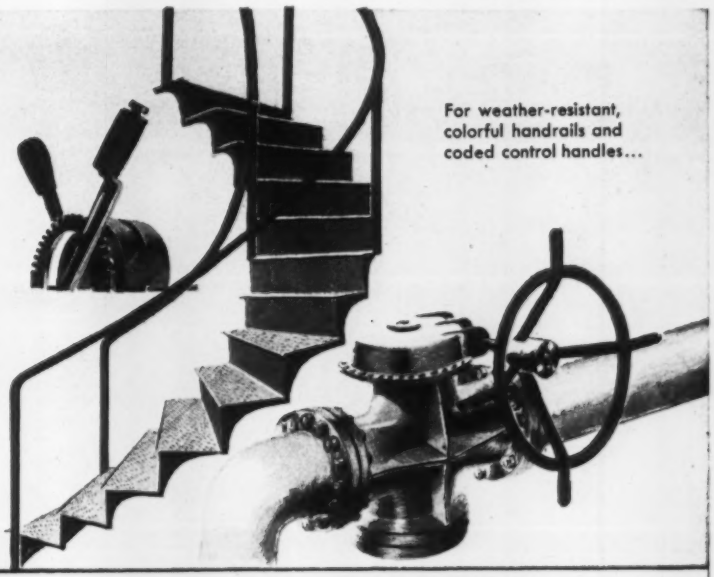
NEW WAY TO UPGRADE YOUR PRODUCTS: VINYL COATINGS

Vinyl coatings on tool handles are tough, wear-resistant, easy-on-the-hands, electrically safe. Can be applied in thicknesses up to 1/16" (60 mils) in one dip.



For weather-resistant, colorful handrails and coded control handles...

For making nonslip ladders, "silent" cutlery drawers...

For bumpers, seats, wheels on metal toys...

Leather-like coatings for metal

You'll see a host of profitable ways to use vinyl coatings when you try their pleasant "feel" and test their tremendous durability. Vinyl coatings feel like leather, wear like flooring. They insulate, control corrosion. Are virtually immune to ordinary chemical attack.

You can apply these resilient coatings to your products in a range of thicknesses simply by dipping them in a vinyl dispersion. A short heat-cure at moderate temperatures "sets" the elastomer and permanently bonds it to the metal.

Vinyl coatings can eliminate some steps in finishing operation, actually reduce total costs. Coatings can range from soft and rubbery to "tire-casing" hard—in any color you choose.

Write for sources of vinyl in liquid form for coating glass, metal, or wood. Get a head start on investigating the many new, market-building ways you can use vinyl dispersions. Write today!

Organic Chemicals Division
MONSANTO CHEMICAL COMPANY
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Monsanto manufactures a wide variety of plasticizers and Opalon® resins for formulators of these high-quality vinyl dispersions.

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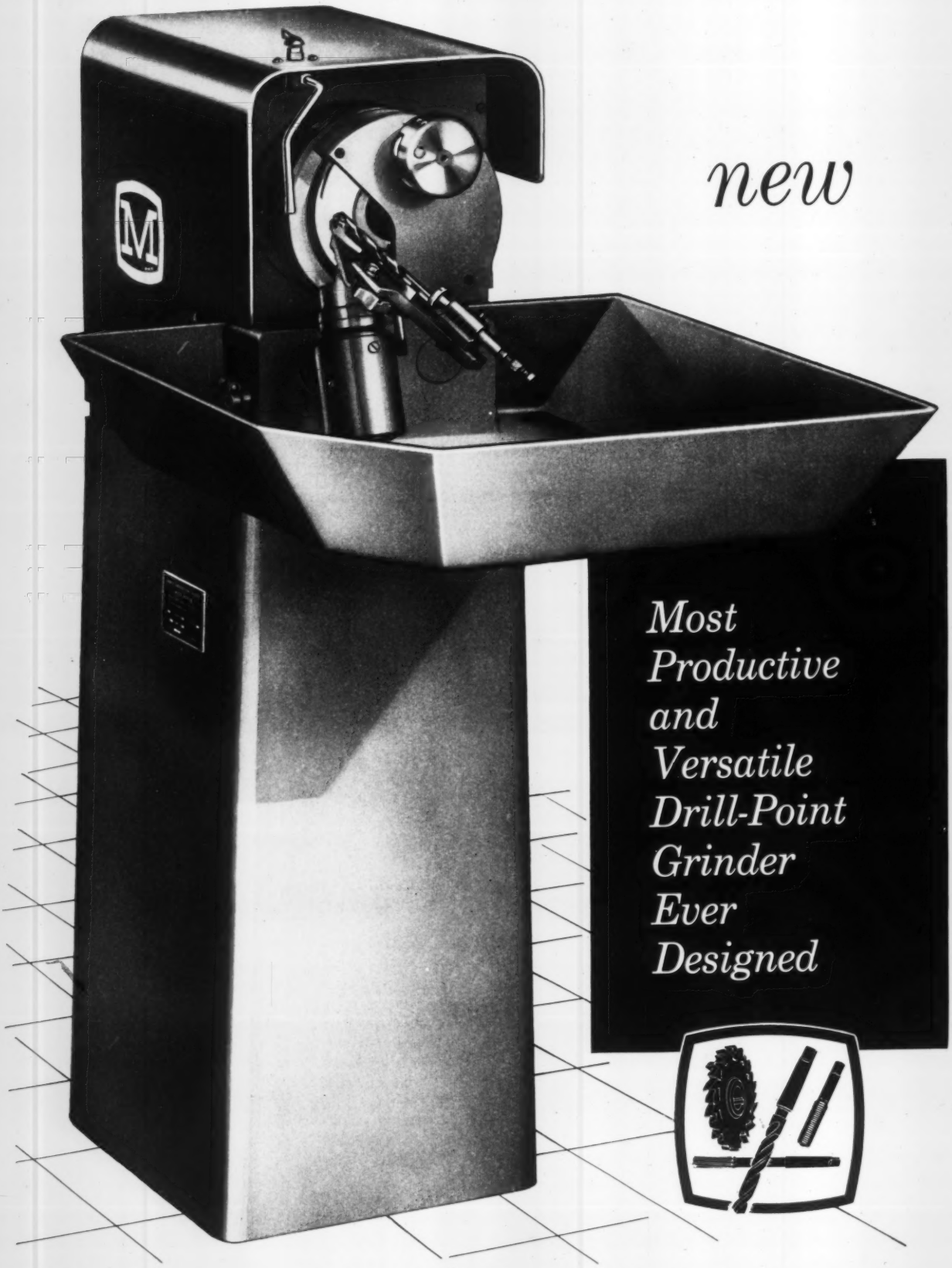
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Productive
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Drill-Point
Grinder
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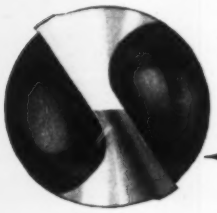
DRILL-POINT GRINDER

Now . . . you can accurately grind points on a profitable, high-production basis.

This new machine, conceived and built by Morse . . . has been thoroughly job-proved in the Morse plant. In fact, this one compact unit, with its attachments, will grind the following points . . .



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HELI-CENTRIC

and **SPLIT POINT...**
(CRANKSHAFT)

on a high-precision, high-production basis. No other machine can match this performance.

For complete details, write for new illustrated bulletin.

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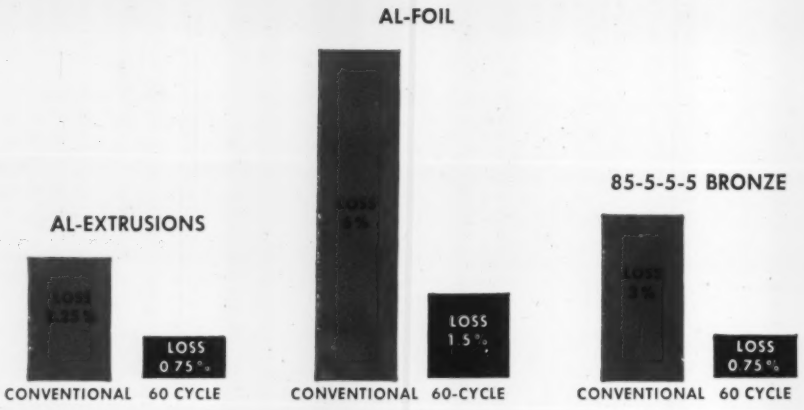
MORSE *means* **"THE MOST"** *in Cutting Tools*

60 CYCLE INDUCTION MELTING
SAVES Metal and Money

METAL LOSS REDUCED



A sharp cut in metal losses is inherent in 60 CYCLE INDUCTION MELTING. Unnecessary metal losses in a furnace can amount to many thousands of dollars per year. Here are three examples of what AJAX 60 CYCLE INDUCTION furnaces have done for others:

ALUMINUM EXTRUDERS: Typical experience of manufacturers of aluminum extrusion billets using AJAX-TAMA-WYATT 60 CYCLE INDUCTION furnaces is a metal loss of 0.75% as compared to 2.25% in conventional fuel fired furnaces. (Based on a charge containing 30-40% extrusion scrap.)

ALUMINUM FOIL MILLS: 60 CYCLE INDUCTION MELTING furnaces are widely used to melt foil scrap and other finely divided materials. Operating reports show a reduction from 6% metal loss in conventional furnaces to 1½% in the coreless AJAX-JUNKER furnace.

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IN ALL THESE CASES, SAVINGS PAID FOR THE EQUIPMENT IN LESS THAN TWO YEARS.

60 CYCLE INDUCTION MELTING has many other important advantages. Our engineers will be glad to analyze your requirements. Please write to AJAX ENGINEERING DIVISION, P. O. Box 1418, Trenton 7, N. J.

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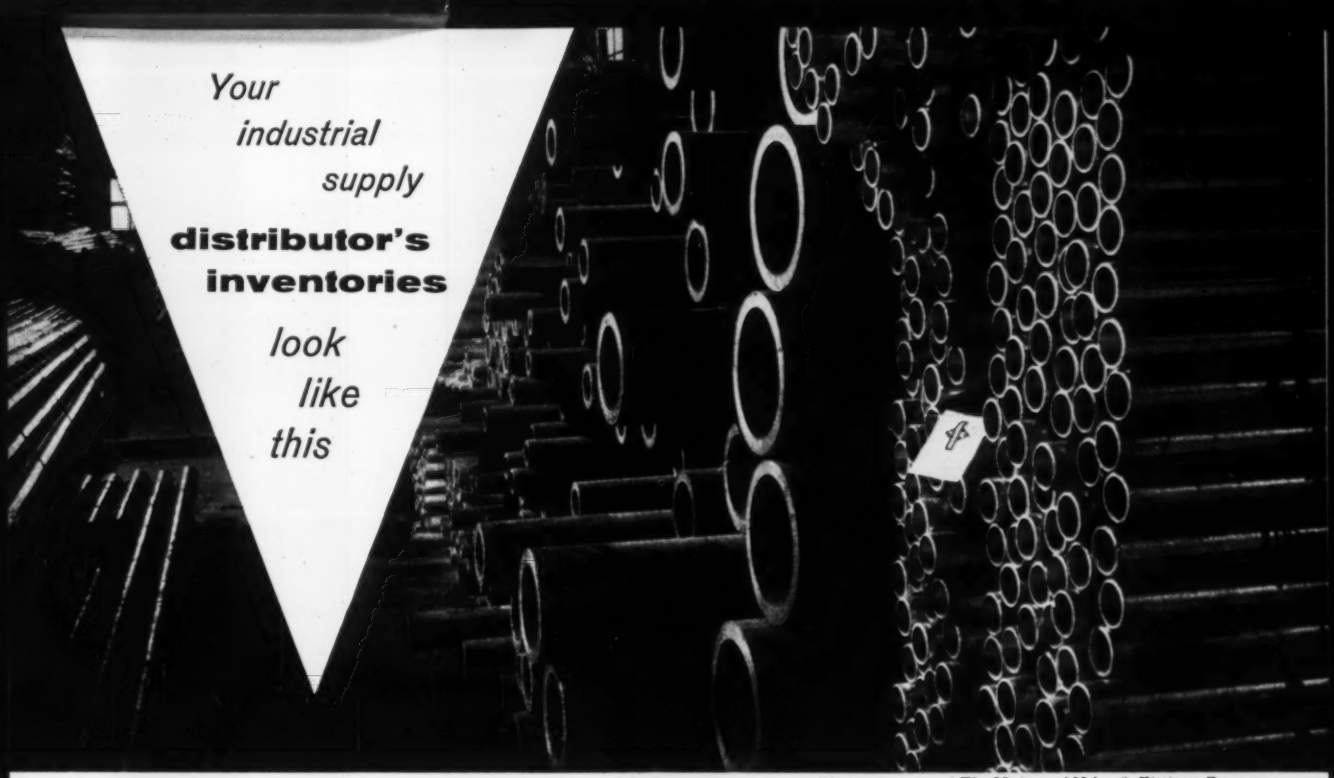


Photos courtesy of The Universal Valve & Fittings Company

To cut inventory costs, make Youngstown's Industrial Supply Distributor your local dependable source for all steel pipe needs. Make full use of his complete local stocks, fast delivery service. His one-source service simplifies your purchasing and bookkeeping, too. You'll find him an efficient, time-saving, partner-in-production.

THE
YOUNGSTOWN
SHEET AND TUBE COMPANY
Youngstown, Ohio

Manufacturers of Carbon, Alloy and Yoloy Steel

YOU CAN'T BARGAIN WITH SAFETY

Wire Ropes may look alike... but it's performance that counts

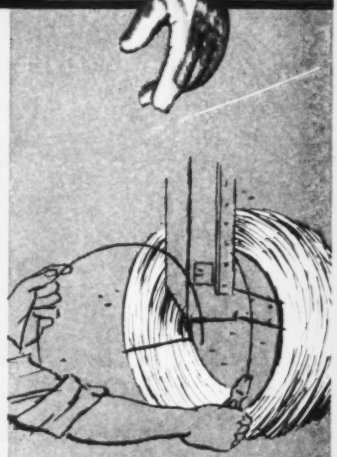
The Image of CF&I stands for the top performance records of all CF&I steel products. For instance, take one of these products—CF&I-Wickwire Rope.

Many brands of rope *look* alike but the rope you buy must pay off in *performance*, not *appearance*. With Wickwire Rope you get a number of quality factors that lead to outstanding performance. These factors are "built-in" the rope through many quality controls and tests. Since CF&I performs all steel producing, wire making and rope fabricating operations within its own plants, exacting control and testing procedures can be carried out and supervised at every step. Here is just one of these procedures:

Both-Ends Physical Tests

Samples are cut from both ends of every coil of wire and given complete physical tests — for tensile strength, roundness, torsion and uniformity of diameter. Coils that fail any test are rejected for such critical applications as wire rope.

We have recently printed several folders that discuss many more Wickwire control and testing procedures, plus wire rope recommendations for specific equipment. To get a copy, contact the nearest CF&I sales office—but please *state your industry or type of equipment.*



Both-ends testing of wire ensures safety and top performance in CF&I-Wickwire Rope.

WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION 6958

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso Farmington (N. M.) • Fort Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Odessa (Tex.) • Oklahoma City • Phoenix Portland • Pueblo • Salt Lake City • San Francisco • San Leandro • Seattle • Spokane • Tulsa • Wichita

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CF&I STEEL

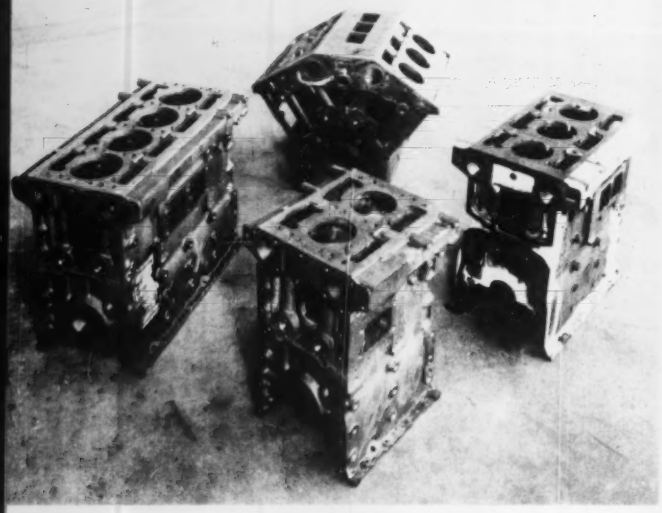
Tomorrow this transfer machine will work on a different part

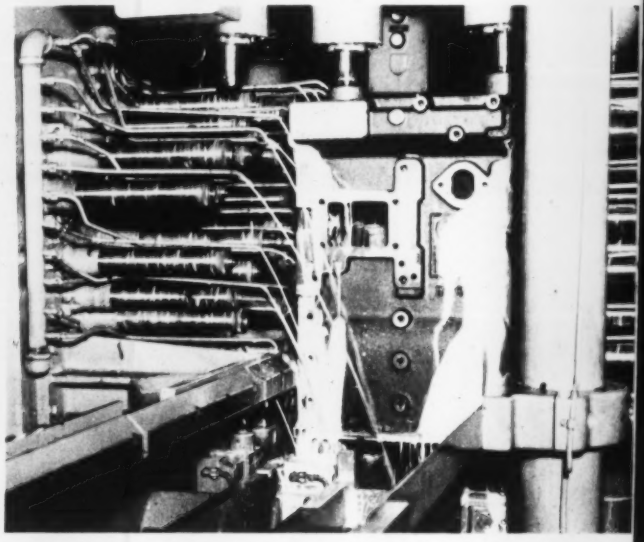
. . . Natco flexible automation can speed your production too.

(see other side)

FOUR PARTS OR ONE CAST IRON OR ALUMINUM

It's all the same to these Natco transfer machines





Look at these four diesel engine blocks. Each is a different machining problem, yet one line of three Natco Holeways does the complete job on them all.

Natco designing skill shows in the easy way these machines accept the four different blocks, either cast iron or aluminum. In only 40 working stations these machines can perform 485 operations. Ingenious transfer devices enable all faces of the workpiece to be machined. Versatile building block construction keeps the line ready for conversion when models change.

Natco Holeway No. 1 is capable of performing 173 different operations drilling, rough boring, reaming, chamfering and counterboring.

Holeway No. 2 does 139 similar operations, including end milling of these same engine blocks.

Holeway No. 3 performs 173 tapping operations. These machines work on all the external faces of the blocks, including the angular faces of the V-block.

Product mix problems? Think what a truly flexible Natco like this could do for them! Weigh the value of a Natco which accepts a variety of parts and decides what work to do on them. Even if your production won't justify this ultimate in automatic machining Natco builds drilling, boring, tapping, facing, reaming, chamfering machines in all degrees of automation.

Standard or special, if your machining job is holes, Natco makes the machine to do it better. Let our representative show you. Call him today.

NATCO NATIONAL AUTOMATIC TOOL COMPANY, INC., RICHMOND, IND.

MEET MRS. PETER PEFF

...and her company's new lightweight liquid-oxygen "vacuum bottle" for jet planes

Mrs. Peff, president, Superior Air Products, Newark, N. J., with Supairco's recently developed liquid-oxygen "vacuum bottle."

MANY a tough problem has been solved by Mrs. Peff and her company since 1952, when she assumed the presidency after her husband's death. Specialists in building low-temperature apparatus and complete plants to produce oxygen and other gases, "Supairco" was asked recently to develop a light, compact container to supply oxygen for aircraft crews at high altitudes.

Ingenious design utilizing the broad and varied properties available in copper and its alloys produced the "vacuum bottle" shown above. The inner sphere is of Everdur®, Anaconda copper-silicon alloy, which has the workability and resistance to corrosion needed —and, more important, the strength and toughness to make possible a relatively thin, light shell that can withstand vibration and fatigue stresses aloft—plus shocks from catapult launchings and carrier landings. The outer shell is of Anaconda copper, highly polished to reflect heat. This, plus a vacuum under .001 microns between the spheres, holds liquid oxygen at −297 F.

Starting with over 100 standard copper alloys, Anaconda can provide an almost unlimited number of combinations of useful properties. When new and unusual problems arise, use Anaconda technical specialists to help you select metals for your needs. Address the American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 594

LEFT: Inside the copper shell in main illustration is this slightly smaller liquid-oxygen container made of Everdur, the metal that spins and machines readily, is easy to join by soldering, brazing, welding. **RIGHT:** Completed liquid-oxygen converter, built by Mine Safety Appliances Company, Pittsburgh, Pa., serves 8-man crew. It is one-third the weight of the cylinder it replaces, takes much less space.

ANACONDA®

COPPER • BRASS • BRONZE
NICKEL SILVER MILL PRODUCTS
Made by The American Brass Company

PENETRATES RUST TO BARE METAL

The specially-processed fish oil vehicle in the Rust-Oleum 769 Damp-Proof Red Primer penetrates rust to bare metal – as proved in radioactive tracing studies.

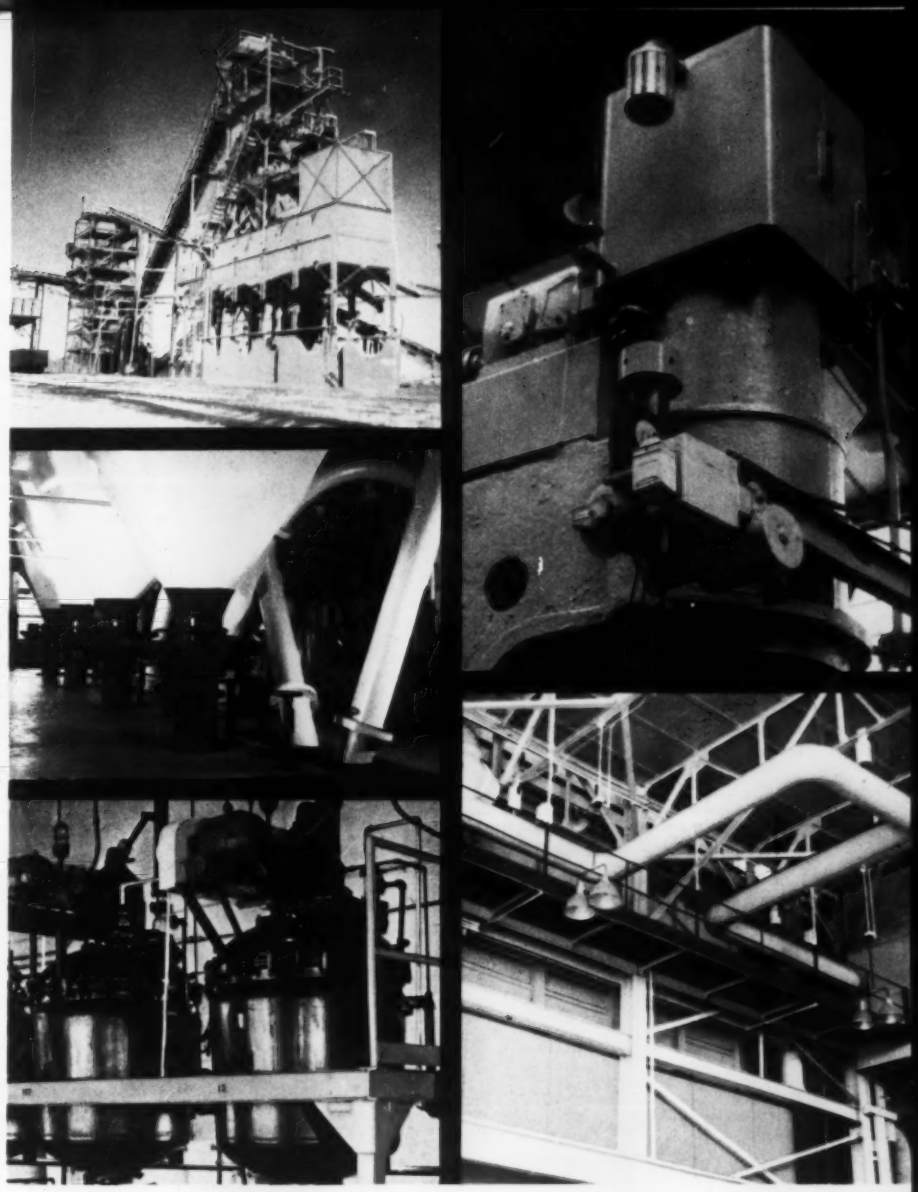
ON RUSTED SURFACES simply apply Rust-Oleum 769 Damp-Proof Red Primer directly over the sound rusted surface after scraping and wirebrushing to remove rust scale and loose rust. You stop present rust, because the *specially-processed* fish oil vehicle in the primer penetrates through the rust to bare metal – driving out air and moisture that cause rust. You save time and money – as costly surface preparations are usually eliminated. It's easier to use, too . . . because the "grease-like" nature of the fish oil vehicle in the primer enables it to slide over the surface and work its way through the rust formations – yet, it dries to a firm, protective, decorative coating that provides a tough, durable base for Rust-Oleum finish colors.

RUST-OLEUM®

STOPS RUST!®

SEE OUR CATALOG IN SWEET'S OR WRITE FOR COPY

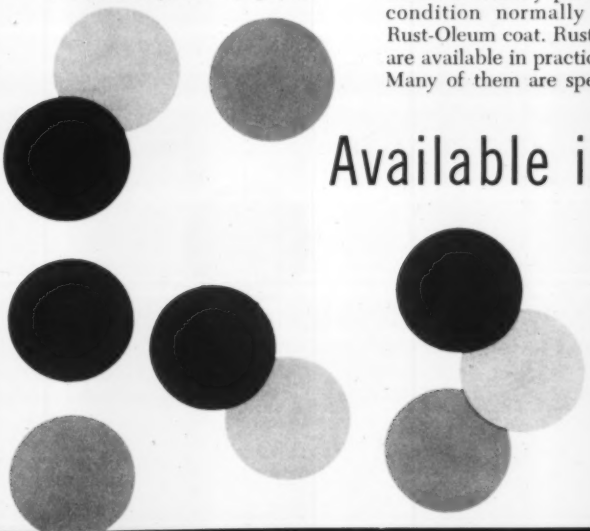
What the Rust-Oleum SYSTEM of lasting beauty does for you!



A matter of excellence.
Distinctive as your own fingerprint.

BRUSH OR SPRAY the Rust-Oleum finish color of your choice over 769 Damp-Proof Red Primer – that's the Rust-Oleum system of colorful, lasting beauty for rusted metal. Previously painted surfaces in good condition normally require only one Rust-Oleum coat. Rust-Oleum top coatings are available in practically ALL COLORS. Many of them are specially formulated to resist heat, chemicals, and other corrosion-producing conditions, while others are formulated to match the original colors on construction, farm, and oil field machinery and equipment. Try Rust-Oleum soon. Prompt delivery, efficient service, and a wealth of rust-stopping experience are yours through your nearby Rust-Oleum Industrial Distributor.

Available in all colors!



SEND FOR FREE TEST SAMPLE! ATTACH TO YOUR LETTERHEAD!

Rust-Oleum Corporation
2983 Oakton Street, Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer for rusted metal surfaces.
- ☐ Complete literature with applications and color charts.
- ☐ Information on matching special colors.
- ☐ Thirty-page report on Rust-Oleum fish oil penetration.

variable speeds direct from standard AC power lines...with

U.S. VARIDRIVE MOTORS

Smooth, stepless speed changes to the split RPM—with the simple, completely self-contained U.S. VARIDRIVE MOTOR! Just plug into any standard AC power line.

Why bother with DC Converter, DC Generators, complicated electronic tubes and circuits that require special technicians? Why risk costly production shutdowns?

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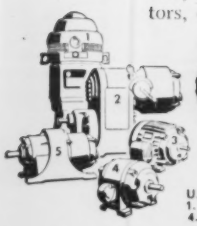

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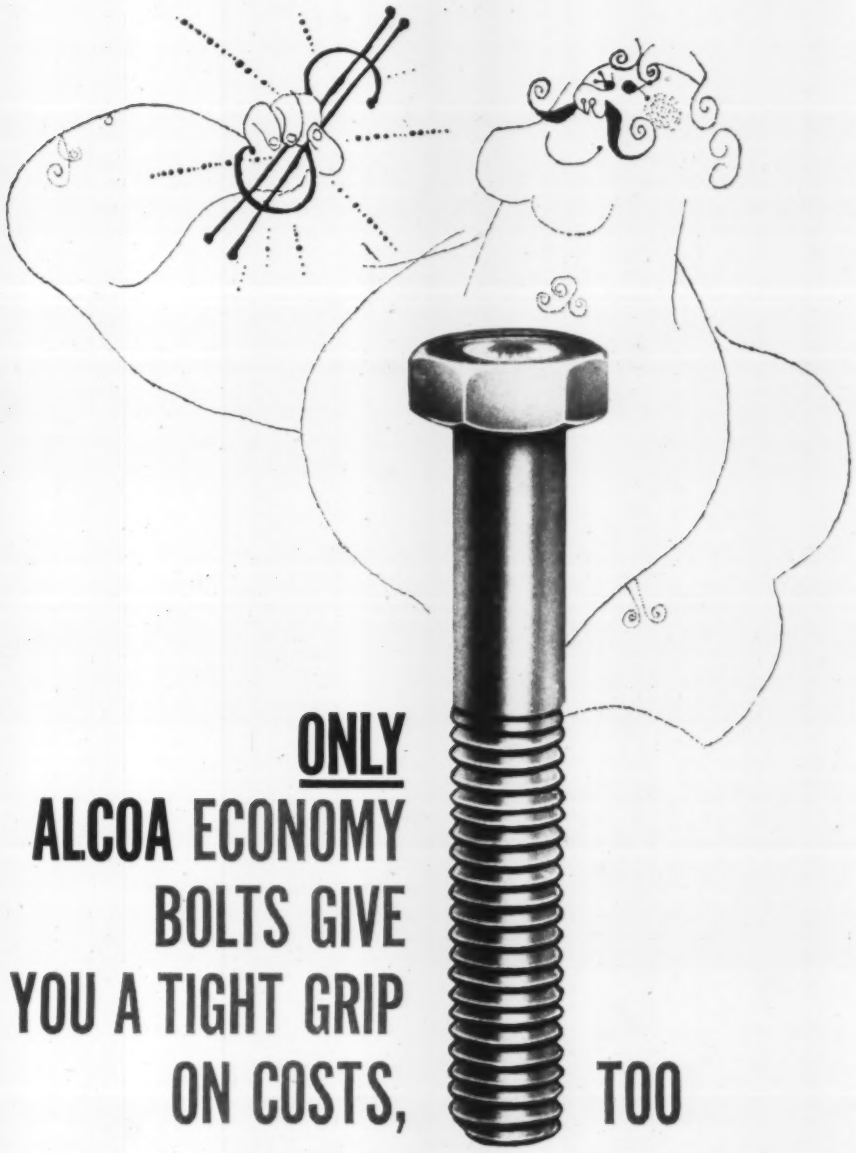

ONLY ALCOA ECONOMY BOLTS GIVE YOU A TIGHT GRIP ON COSTS, TOO

If you want to get tight-fisted about fastener costs . . . without sacrificing product quality . . . better turn to Alcoa® Aluminum economy bolts. Bright and flawlessly finished, they cost less than any other corrosion-resistant fastener. Order them for practically any general application where you now use more expensive trimmed-head bolts. They'll add extra sales appeal to your product *at no extra cost.*

Made to American Standards specifications, they conform to dimensional and tolerance standards for regular hexagon-head bolts. And, remember, you get *full* count, *full* quality when you specify Alcoa Aluminum Fasteners.

Call your Alcoa Distributor. You'll find your Alcoa Distributor listed in the Yellow Pages of your phone book. He carries complete stocks of all standard types and sizes . . . delivers quickly, anywhere, any time. Call him now and find out how you can cut costs. For free samples and additional facts, mail the coupon today.

Your Guide to the Best in Aluminum Value

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Gentlemen: Please send complete specification data and samples of Alcoa Aluminum Fasteners.

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Title_____

Company_____

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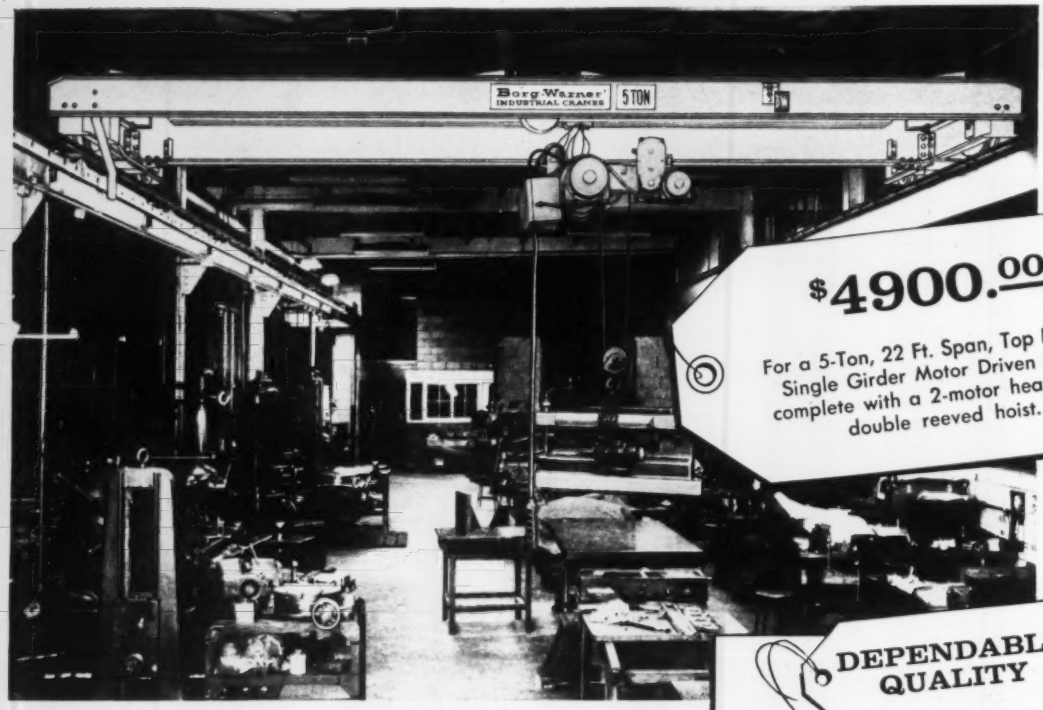
PRODUCTION WISE and COST CONSCIOUS!

Borg-Warner quality assures you of top value in every capacity, performance and price range



$4900.00

For a 5-Ton, 22 Ft. Span, Top Running Single Girder Motor Driven Crane complete with a 2-motor heavy duty double reeved hoist.

PRODUCTION WISE

There's no room in this busy shop area for aisle-filling floor-type handling equipment. But, an economical Borg-Warner 5-Ton Crane System transports materials and work swiftly, smoothly and quietly with minimum interference to production.

COST CONSCIOUS

Borg-Warner engineers and production men have made extensive use of interchangeable, standardized components resulting in real savings for you. You get more crane, more performance and greater dependability, for a smaller investment.

If you are planning on expansion or modernization, it will pay you to find out how Borg-Warner Industrial Cranes can supply you with the best values in overhead materials handling equipment.

DEPENDABLE QUALITY

- Full 5-ton rating with ample reserve capacity.
- Heavy duty Borg-Warner Motor Reducer Bridge Drive with integral fluid coupling.
- Heavy duty double reeved close headroom hoist.
- Heavy duty forged steel wheels.
- All welded, jig assembled, jig bored end trucks.
- Long life precision ball and roller bearings.
- Precision assembly of girder and end trucks with fitted bolts in reamed holes.
- Outrigger machinery girder construction.
- Full magnetic push button control.

ADVANCED DESIGN

The N-TRMD illustrated is a typical Borg-Warner Industrial Cranes Top Running Single Girder Motor Driven Crane. The precise equipment to meet your specific needs is available. Consult with Borg-Warner Industrial Cranes engineers.

Industrial CRANES

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B-W

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Design it better ... Make it better.

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Export Sales: Borg-Warner International, 36 South Wabash Ave., Chicago 3, Illinois

Education in High Gear

Knowledge is the destination of this vehicle — the world's first Mobile Laboratory for Automotive Research and Education.

J&L stainless steel is used exclusively for exterior and interior components to help assure long, useful life. Part of that life will be devoted to gaining a better understanding of how stainless steel combats corrosion, provides greater structural strength, reduces weight, improves performance.

The high stength and durability of stainless steel can provide greater design freedom, more economical production and longer service life for all functional automotive components.

J&L leads the industry in melt shop standards for stainless steel—the point where quality starts, **and engineering achievement begins.**

This unique Mobile Laboratory was presented to the University of Michigan by The International Nickel Company. It was adapted from a 27-foot General Motors Coach by Ionia Manufacturing Div., The Mitchell-Bentley Corp. Contributing companies include: General Motors Corp.—Styling Staff, Engineering Staff, Proving Grounds, Truck and Coach Div., Harrison Radiator Div., and Frigidaire Div.; United States Rubber Company; Lyon, Inc.; and Friez Instrument Div., Bendix Aviation Corp.

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Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Box 4606, Detroit 34

Announcement of Major Significance

FOR EVERY USER OF SOCKET HEAD CAP SCREWS

Following exhaustive studies begun in 1954, the socket screw products industry adopted, on April 24, 1959, new dimensional standards for socket head cap screws. Standard Screw Company participated in these studies and concurred in the recommendations approved by leading fastener manufacturers.

Adoption of the new standards, to be known as the "1960 Series", has important implications for every user of socket screws. As a public service Stanscrew will point out these implications . . . not only in relation to its own products, but also to the overall program of the industry.

Differences, Advantages Of New Design

The "1960 Series" has been carefully engineered so there is functional uniformity for all sizes, particularly as it applies to wrenching areas and to the relationship of head diameters to body diameters. For most sizes, as illustrated, this means substantial increases in both head diameter and socket size, and thus provides these advantages over the present design:

1. *Maximum utilization of the fastener's inherent strength . . . larger wrenching area permits application of greater clamping force.*
2. *Increased bearing surface under the head . . . up to 233% more.*
3. *Minimum indentation . . . particularly important with softer metals.*

Should You Convert Now?

Obviously, for many applications, the new design offers important benefits which indicate conversion as rapidly as possible. In some cases, however, existing product design may not accommodate the larger heads . . . or, where socket cap screws are countersunk, revising your countersinking operations may create significant production problems. Stanscrew urges, therefore, that each company learn complete facts on the fastener industry's future plans.

Timetable For Industry Changeover

Stanscrew has already started production of the new "1960 Series". Manufacture of the present (1936) series will continue, however, and they will be available as standard, in-stock items until at least January 1, 1961. At that time, it is now contemplated the "1960 Series" will become the accepted standard throughout industry and the "1936 Series" will then be furnished only when specifically ordered.

When Designing A New Model

For products now on the drawing board, this timetable indicates many manufacturers should plan to use the "1960 Series" as the standard for later production. By making such design provisions, you assure maximum acceptance and minimum difficulty in the future.

For Existing Products

For many existing applications, where socket cap screws are not countersunk, either the 1936 or the "1960 Series" may be used. In frequent cases, improvements of the 1960 design suggest conversion within a short period. In other applications, where the heads are countersunk or where the greater head diameters of the "1960 Series" create a problem, changeover should probably be postponed until a general redesign of your product is scheduled.

Special Stanscrew Marking

To further distinguish its "1960 Series", Stanscrew will knurl heads of all new style socket cap screws with a split herringbone design (as shown). This special marking and the new "1960 Series" box labeling will provide quick identification of these quality fasteners.

For Further Information

Your Stanscrew distributor has the latest facts on the new "1960 Series" and will be happy to discuss them with you. If desired, he also will arrange for a prompt visit from a Stanscrew fastener specialist who will be most happy to go over all aspects of this new industry program as it regards your own particular operation.

Stanscrew also has a new brochure which provides complete dimensional and design data on the "1960 Series". No obligation, of course, for your copy.

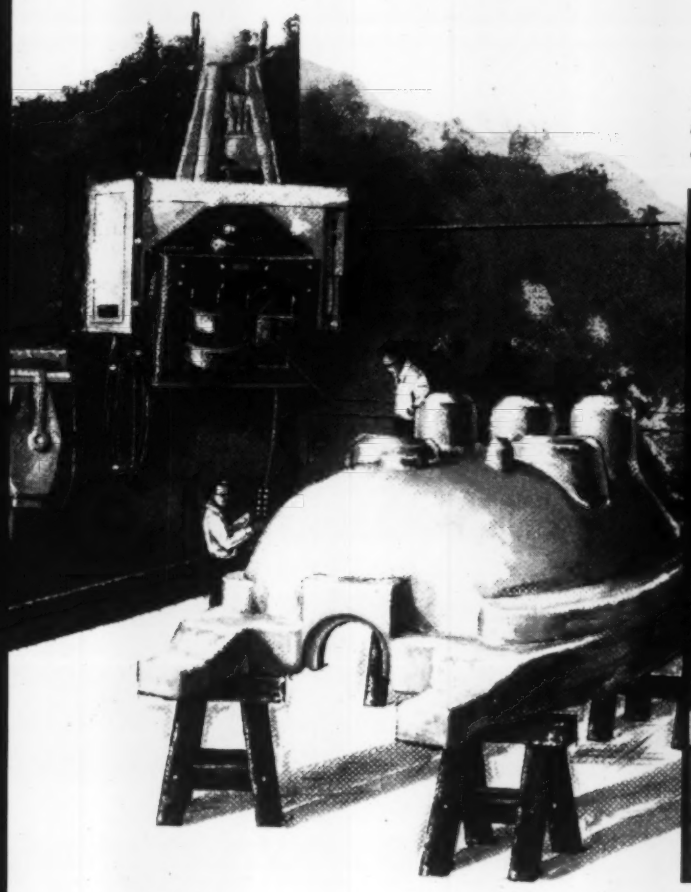
STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

...where industrial progress is cast in steel

NON-DESTRUCTIVE TESTING
...the inside story



To insure the required quality throughout, the most modern non-destructive testing equipment is used at General Steel.

To meet rigid specifications for high temperature, high pressure and other applications requiring quality components, General Steel uses the most modern non-destructive testing equipment available. Testing for quality is performed by various methods depending on the type of structure.

Among the facilities available at General Steel are magnetic particle inspection units to check for invisible surface defects, and ultrasonic reflectoscope units for sonic testing of internal metal. Radiographic inspection of very heavy structures is done with 24-million volt Betatron units. Conventional X-ray equipment is used for smaller structures. Other methods of non-destructive testing are also available.

Profit from General Steel's wide experience in the design and production of high quality product components made of cast steel, cast-weld or composite structures. Let our staffs work with you in developing designs for optimum performance.

Write for folder **How General Steel Castings Can Improve Product Design and Performance.** General Steel Castings, Station 230 Granite City, Illinois

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GRANITE CITY, ILL. • BOOYSTOWN, PA. • AVONMORE, PA.

For aluminum that's just right for your product...

Home cleaning equipment

Office furniture

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check with ANACONDA ALUMINUM

What is aluminum that's "just right" for your product?

It's aluminum carefully produced to your exacting specifications and shipped on schedule. And that's Anaconda Aluminum—aluminum in virtually any form, all custom-produced to insure that you're a satisfied customer.

Our custom production policy is made possible by the flexibility designed into all Anaconda Aluminum's modern plant facilities. Your order is scheduled promptly. And, from the moment it's written until it's shipped, your order gets the personalized attention of aluminum experts at every stage—another important part of this basic policy of making sure your aluminum is exactly right.

To fully meet your requirements, Anaconda Aluminum combines this small-shop personality with the facilities to supply you aluminum in many forms—pig and ingot, coiled and flat sheet, rod, bar, structurals, tubing and other extruded shapes.

What you want, when you want it—that's the kind of service we offer aluminum buyers. To get it, call your local Anaconda Aluminum representative, or write our General Offices, Dept. S-8, Louisville 1, Kentucky.

Every industry has one member who specializes in customer satisfaction

ANACONDA ALUMINUM

ANACONDA ALUMINUM COMPANY • GENERAL OFFICES, LOUISVILLE, KENTUCKY

Hoover pillow blocks with ductile cast housings

Hoover introduces a new, economical pillow block ball bearing unit with cast housing of ductile material that absorbs shock and vibration, assuring long bearing life. It is designed to carry light loads at normal speeds.

The unit contains a pre-lubricated bearing featuring ultra-smooth *Hoover Honed* raceways and a perfectly matched set of *Micro-Velvet* balls, a guarantee of unexcelled quality. Known as the E D series, these new pillow block bearings are available in shaft sizes from $\frac{1}{2}$" to $1\frac{3}{16}$".

Hoover also offers a cast iron pillow block bearing for light to medium load conditions, plus a wide range of flange and machine units.

hoover

BALL AND BEARING COMPANY

5400 South State Road, Ann Arbor, Michigan

Sales Offices and Warehouses: | 2020 South Figueroa, Los Angeles 7, California
290 Lodi Street, Hackensack, New Jersey

Hoover Honed and *Micro-Velvet* are Hoover trademarks.

NEW BULLETIN 106 DESCRIBES COMPLETE LINE OF NEW HOOVER PILLOW BLOCK BALL BEARINGS!

Please return coupon for your copy

S-8

Hoover Ball and Bearing Company
5400 South State Road, Ann Arbor, Michigan

Please send new Bulletin 106, which describes Hoover pillow block ball bearings.

Name_____

Title_____

Company_____

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PROCESSES

LOOK FOR THE DIAMONDS—SIGN OF FINISHING QUALITY

EQUIPMENT **SUPPLIES**

Now—from Allied Research

—a new systems concept for the finishing of metals.

Process Engineering Service

The first—and only—service built around the most important part of your operations . . . your process requirements.

Why a PROCESS Engineering Service?

Allied Research's long and broad experience in helping customers solve process and equipment problems of all types has led to one important conclusion:

Only by integrating equipment with your particular process are you assured of getting these important benefits from your operations: (1) higher production, (2) greater efficiency, (3) lower operating costs, (4) consistent product quality.

Our success in helping our many customers reach these important objectives has prompted us to offer this unique service to the entire metal finishing industry.

What does our Process Engineering Service consist of?

CONSULTATION—Experienced representatives will assist you in properly planning any part of or all your process and equipment requirements.

RECOMMENDATION—Trained engineers will recommend the particular process, equipment and chemicals to provide you with the best in operating efficiency and economy for your specific production requirements.

INSTALLATION—Planned, engineered and supervised—including plumbing, electrical, ventilation and disposal requirements—or whatever else is needed to assure efficient and proper operations.

SERVICE—Field Engineers insure proper start-up and will make necessary maintenance recommendations. They are available for periodic check-up.

"TURN-KEY" Service—let Allied Research take complete responsibility for laying-out, designing, building, installing and servicing your complete process operations. *Open the door to your plant and start production.*

Get the complete details on Process Engineering Service today. Call your Allied Field Engineer. He's listed under "Plating Supplies and Equipment" in the yellow pages. FREE TECHNICAL DATA FILES on Allied Research processes, equipment and chemicals sent on request.

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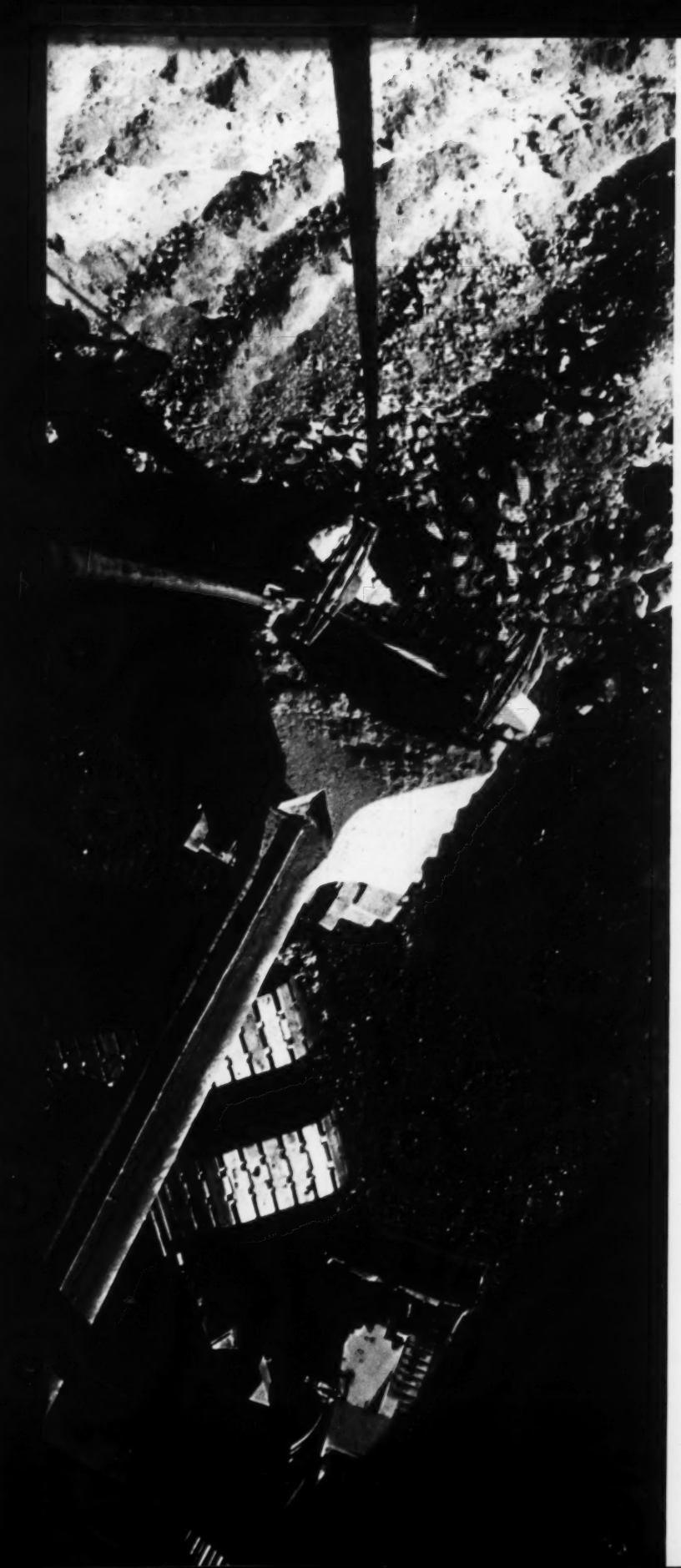

Big Paul digs and dumps 105 tons in 50 seconds!

USS "T-1" and TRI-TEN Steels cut dead weight—boost strength

Even from a 100-foot-high perch, the mammoth size of the bucket of Big Paul, the King of Spades, is hard to comprehend.

There are three of these 70-yard giants—all built by Marion Power Shovel Company. All achieve strength and toughness with least weight by the use of USS "T-1" Constructional Alloy Steel and USS TRI-TEN High-Strength Low-Alloy Steel.

Big Paul sets the pace at the Peabody Coal Company's River King mine near Freeburg, Illinois. It rams through rock and shale to uncover some two million tons of coal per year.

Since 1950, the art of big shovel making has increased dipper size from 35 to 45, 55, 60, and now 70 cubic yards per bite. Most of the buckets and dipper sticks of these giant shovels are made of USS "T-1" Steel, for otherwise, it would be almost impossible to make them light enough and tough enough. They hold up in this service, taking terrific impact abrasion and shock loading, even in the dead of winter. This is possible because USS "T-1" Steel retains its toughness at temperatures far below zero.

Dipper Size Increased 25%

USS "T-1" Steel has often enabled a boost in the capacity of original equipment without increasing weight. For example, a 20-yard bucket was replaced with a 24-yard "T-1" Steel job. Other dippers were boosted from 26 yards to 32, and 36 yards to 45—increases of 25%.

Many other parts—dipper stick, bail handles and crowd rack—are built stronger and lighter with this 90,000 psi minimum yield strength constructional alloy steel. (USS "T-1" Steel plates up to 2½ inches thick inclusive are *now* available with a minimum yield strength of 100,000 psi.)

The booms and A-frames of most shovels over 45 yards are designed with high-strength low-alloy steels with 50,000 minimum yield point . . . usually USS TRI-TEN Steel.

Perhaps you need a steel that offers higher yield strength, extraordinary toughness and resistance to impact abrasion, combined with relative ease of fabrication. USS "T-1" Steel is your answer, and we'll gladly help you adapt it to your application. For free booklet, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania

USS, "T-1" and TRI-TEN are registered trademarks

◀ 70-yard dipper and handle, crowd rack, bail and sheave blocks—all built stronger and lighter with USS "T-1" Steel

United States Steel Corporation – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
United States Steel Export Company

United States Steel

Navy goes fission again

On this vertical boring mill at U. S. Steel's Homestead Plant, you see a forged steel flange that will serve aboard one of the Navy's new guided missile frigates. These are an entirely new class of naval vessel—their primary mission is the destruction of air targets and they are nuclear-powered.

The flange will be welded to other forged steel parts to form a sealed nuclear reactor vessel. Only a forging of the very best quality is suitable for this critical service. To obtain this quality, vacuum-cast electric furnace steel was used. The flange was carefully forged from a Ni-Cr-Mo alloy ingot about 72″ in diameter and was heat treated to meet rigid specification requirements. Mechanical tests as well as magnetic particle and sonic inspection methods were utilized to assure a quality product. As shipped, the flange weighed over 21½ tons.

Many nuclear forgings like this one are made by U. S. Steel because here, the complete production is supervised and controlled by a team of forging experts. They melt the steel, pour the ingot, forge, heat treat and machine it. The very same team of USS Forging experts who made this flange will fill your order. We welcome your inquiries or requests for our free 8-page booklet about USS Nuclear Forgings. Write to United States Steel, 525 William Penn Place, Room 6030, Pittsburgh 30, Pa.

USS is a registered trademark

United States Steel Corporation — Pittsburgh
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Tennessee Coal & Iron — Fairfield, Alabama
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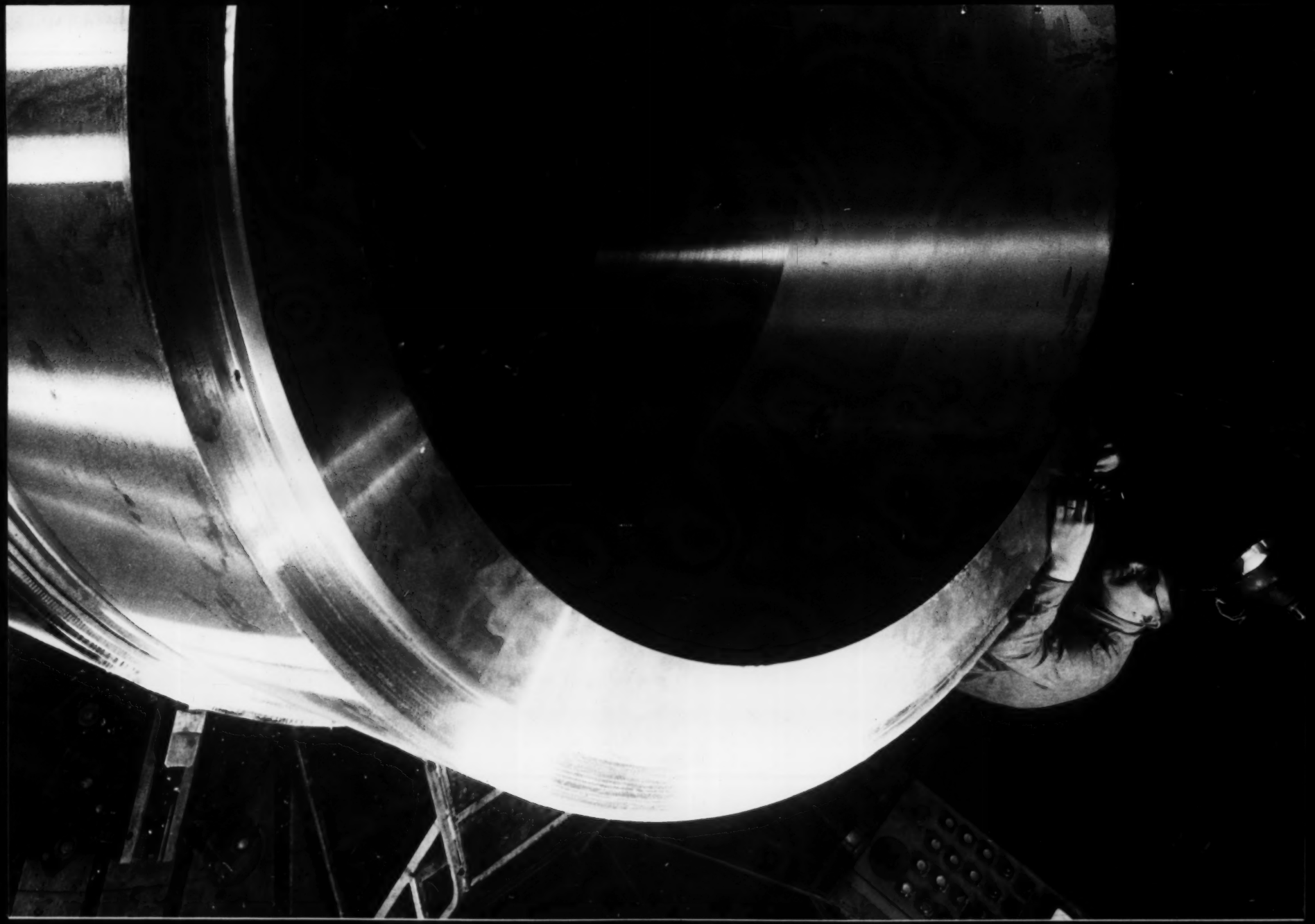
United States Steel

USS



Wood proves Stainless Steel is simple to fabricate

General Sales Manager, C. Paul Carlson, points to the Stainless Steel milk cans designed and manufactured by the John Wood Company.

There's probably no one that has more experience and know-how with Stainless Steel fabrication than the John Wood Company. At eight different plants in the U. S. and Canada, the company makes everything from gasoline pumps to milk strainers. At their St. Paul plant they are equipped to produce 50% of the Stainless Steel can requirements for the entire dairy and dispenser industries.

The company worked closely with sanitation experts and health officials to design a Stainless Steel can that meets the strictest regulations for both material and workmanship. And at the same time, they found ways to simplify fabrication and save time and materials. They developed methods of hydraulic forming, welding, grinding and polishing that have paid off in lower costs and a quality product. These Stainless cans have a hard, durable finish that is easy to clean, ready for long, sanitary service. The John Wood Company proved that Stainless Steel isn't difficult to fabricate, it's just different.

If *you* would like to have complete information about working with Stainless Steel, write for a free copy of our *Stainless Steel Fabrication Book*. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

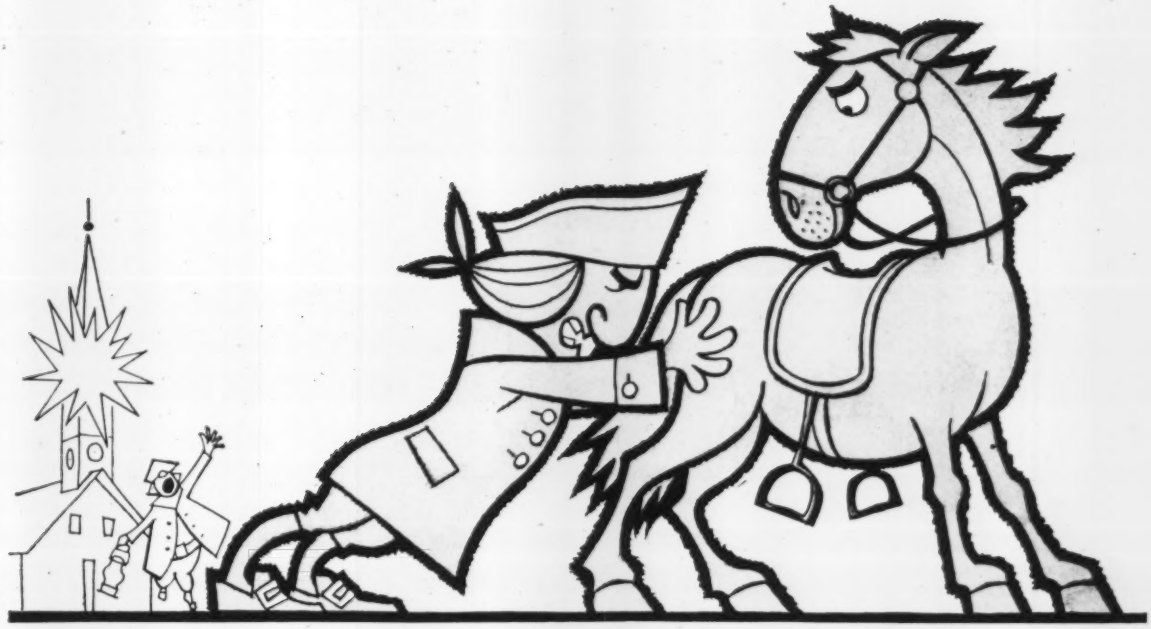
USS is a registered trademark

USS

United States Steel Corporation – Pittsburgh
American Steel & Wire – Cleveland
National Tube – Pittsburgh
Columbia-Geneva Steel – San Francisco
Tennessee Coal & Iron – Fairfield, Alabama
United States Steel Supply – Steel Service Centers
United States Steel Export Company

United States Steel

Man's Eternal Struggle with the Machine



THE REQUIREMENTS OF THE SPACE AGE DEMAND MORE FROM MACHINES AND TECHNIQUES THAN EVER BEFORE

Will the conquest of space wait while you make new machines work right?

Hardly! Not when the competition is boasting they'll bury us all.

Your job is to produce missiles and space craft. That's a full-time job in itself. Your responsibility for specifying equipment and processes only adds to that work-load. Obviously, you can't afford to be buried under new machines that can't be qualified and certified in the shortest time with the least expense and effort.

Sciaky knows you have to produce on time and to the most rigid specifications. That's why Sciaky's responsibility just *begins* with equipment design and manufacture. That's why Sciaky welding machines are fully tested and proved to do *your* job *before shipment*. That's why Sciaky machines are commonly installed, qualified, and certified in the shortest possible time. And, that's why Sciaky Service Engineers are ready to back you fully.

Why take less than the full advantage of talking with a Sciaky Application Engineer when you are considering equipment. No obligation, of course.

The aviation industry has been taking that advantage ever since Sciaky machines made it possible to resistance weld aluminum in production. The entire Sciaky organization has been built by satisfying people just like you. As a result, Sciaky has produced almost all the basic advances to the technology of resistance welding since the year 1917.

SCIAKY

73A

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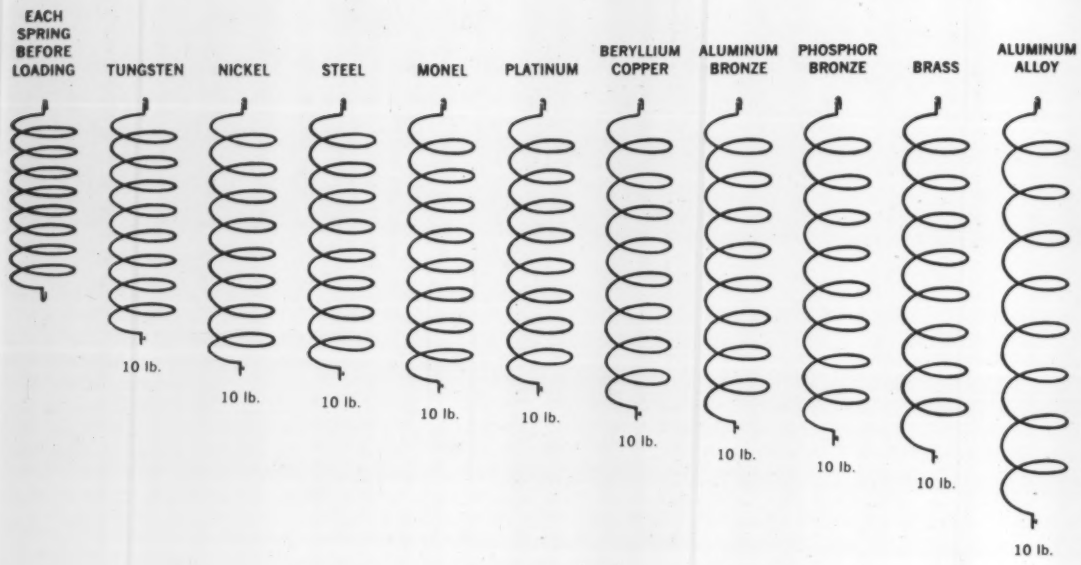

How much deflection do you want in a spring ?

The wide range of stiffness characteristics available in different materials offer unusual opportunity to solve spring deflection problems. How wide is shown in the chart above. The tension springs are all of identical dimensions but of different materials and indicate the relative deflection obtained from applying the same load (assuming the stresses are within safe limits). This basic principle is often overlooked in the approach to spring selection not only of extension springs but other types: flat, torsion, etc. Because our daily work includes such a wide range of spring usage, we are in a position to help you in the early stages of spring consideration, both in material selection and production short cuts. A handy pamphlet to have at your elbow is our "Metal Selector." Write for your copy.

Associated Spring Corporation

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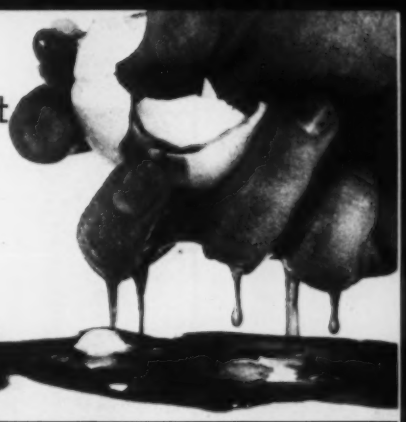
5806

End that "ROTTEN EGG" odor in your plant

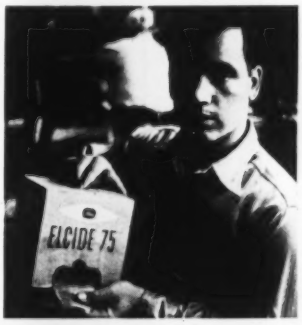


Odor's bad enough. But even worse, it costs you money! For "rotten egg" odor is the sure sign of a rancid coolant. How do you prevent spoilage and cut costs? Elcide 75 does it more effectively than any other bactericide on the market! HERE'S HOW:

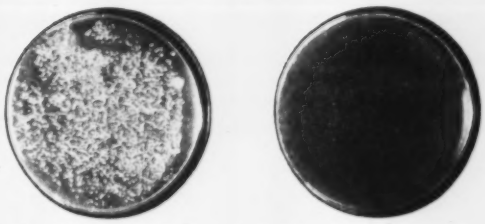
These bacteria are called Pseudomonads. They're present in all soluble oil emulsions. During the heat of summer, they multiply and set the stage for a secondary contamination by . . .

Sulfate-reducing bacteria. They follow Pseudomonads and feed on the emulsifying agent in soluble oils. As they multiply, they give off hydrogen sulfide gas which smells like rotten eggs.

This contamination eventually causes a separation of the oil-water mixture and leads to corrosive slime and sludge that clogs screens, filters and may damage machines, tools and products.



One ounce of new Elcide 75 in each four gallons of fresh emulsion eliminates these bacterial problems *completely!* Controlling a wider range of bacteria than other inhibitors, Elcide 75 really *stops* bacteria build-up and lengthens the life of emulsion by as much as 5½ times!



Here are two samples of the same used emulsion. The one at left was not treated. Notice the heavy growth of bacterial colonies. The emulsion at right was treated with Elcide 75. It's clean and fresh.

ELCIDE 75: **THE MOST EFFECTIVE BACTERICIDE** because it (1) controls a wider range of bacteria, (2) is more effective (through double action) and (3) gives coolants longer life than other bactericides on the market. Elcide 75 prevents odors, checks sludge, protects machines, cuts downtime, saves coolant, reduces disposal problems.

Prove the value of Elcide 75 with your own cost analysis. For more information, or to place your order, write today.

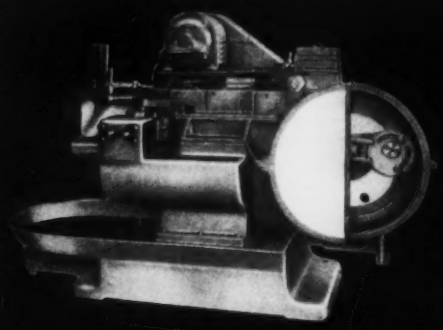
ELCIDE 75™

PATENT PENDING

KEEPS COOLANTS FRESH AS A DAISY!

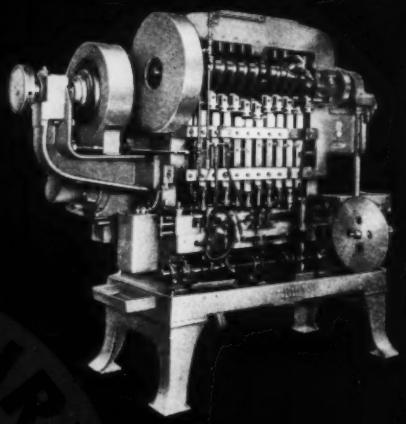
Lilly's brand of bacterial inhibitor for cutting fluids

ELI LILLY AND COMPANY • AGRICULTURAL AND INDUSTRIAL PRODUCTS DIVISION • INDIANAPOLIS 6, INDIANA • TELEPHONE: MELROSE 6-2211



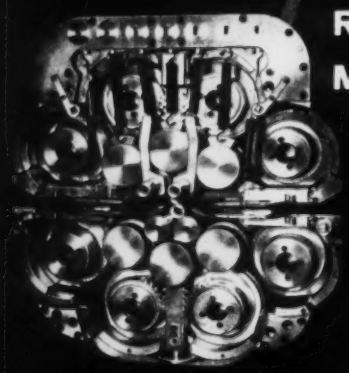
COLD HEADING
MACHINERY

EYELET, SLITTER
& WIRE
MACHINERY



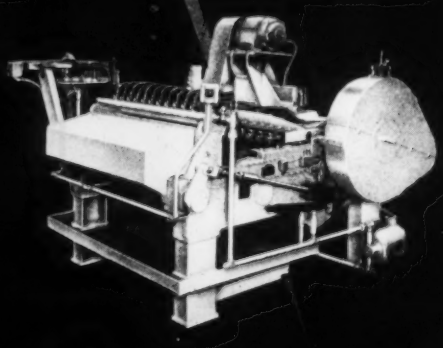
WATERBURY FARREL

MACHINERY BUILDERS

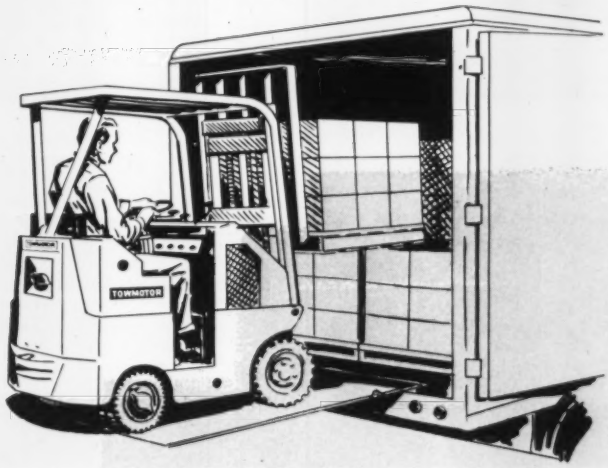


ROLLING MILL
MACHINERY

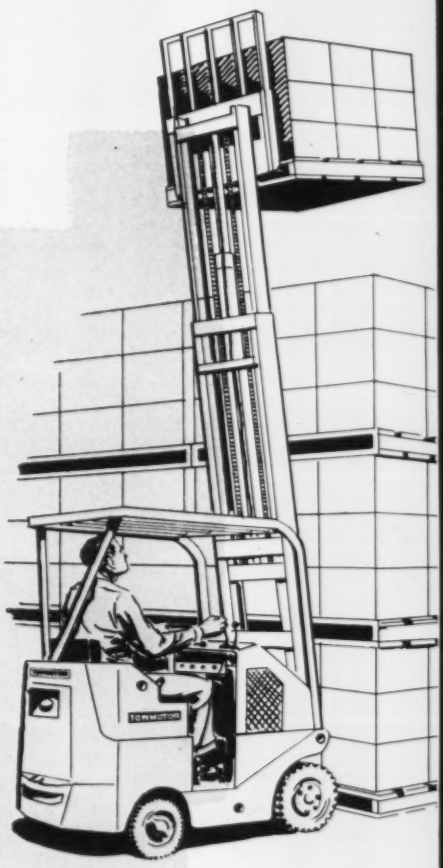
POWER
PRESSES



THE WATERBURY FARREL FOUNDRY & MACHINE CO.
DIVISION OF TEXTRON INC.
Waterbury, Connecticut, U.S.A.
Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.



LOW CEILING! Less than six feet high, this Model 410 safely enters low-headroom vans, trailers, trucks and boxcars. And the new Towmotor High Free Lift Triple Mast—providing 65" of "free lift" at 180" of lift—permits floor-to-roof loading!



HIGH CEILING! Same fork lift truck stacks ton-loads of materials onto 12-foot tiers. Standard Towmotor Overhead Guard offers extra protection for operator. (Other models in "Van-Stack" series handle loads up to 3000 pounds.)

Introducing
Towmotor "Van-Stack"
Series Fork Lift Trucks

New Towmotor does double duty!

You'll profit in many extra ways by owning a new Towmotor "Van-Stack" Series Fork Lift Truck.

"Almost unbelievable—but I saw it!" said an amazed MHI Show-goer who witnessed this double-duty lift truck in action in June. Thousands saw it drive in low-headroom trailer, load it to roof, then stack heavy units on 12-foot high tiers.

This truck (only 32" wide) zips through congested 3-foot aisles—maneuvers sharp corners—hustles big loads indoors and out—and enters elevators for fast floor-to-floor service.

On top of all this, its increased hoisting speed, dual-entry convenience, powerful 4-cylinder "economy" gas or LP-gas engine, weatherproof instrument panel—and other exclusive Towmotor features—make it the foremost fork lift truck in 2000-3000 pound class! Ask for *"Van-Stack" Series Folder SP-25.* Write Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR ® **-GERLINGER** LEADERS FOR 40 YEARS IN BUILDING FORK LIFT TRUCKS, CARRIERS AND TRACTORS

THE ONE-MAN-GANG

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

000 Series Angle Wrenches
NEW
75% more output . . . for
$3750 Dividend Dollars/year.

01 Series Angle Wrench
NEW
44.4% more output . . . for
$2220 Dividend Dollars/year.

4 NEW SERIES IR ANGLE WRENCHES

NEW designs NEW speeds NEW power to give you an

ANNUAL DIVIDEND on your PAYROLL DOLLARS

If your operators are using older model angle wrenches, you can increase their man-hour productivity by as much as $3750 Payroll Dollars in one year, just by replacing the older tools with one of the four new I-R designs.

Multiply these *Annual Dividends* by the number of angle wrench operators in your plant, and you can see why management today is taking a new look at portable tool operations.

There's a fast, easy way to calculate the amount of *Dividend on Payroll Dollars* these new I-R angle wrenches can help you earn in just one year—without adding to your present payroll.

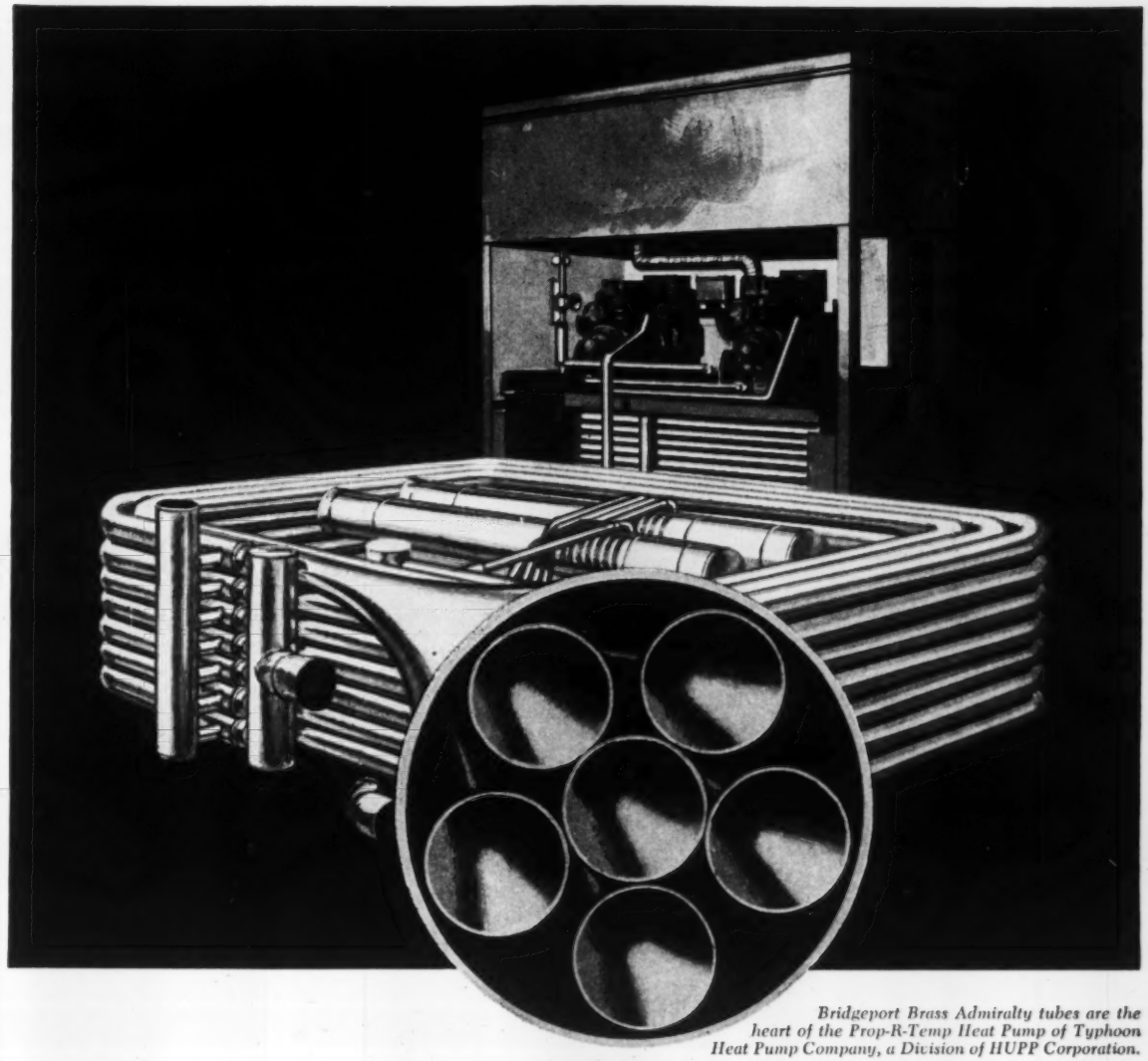
It's yours without obligation. To get it, call your I-R AIRengineer today. Or write Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

Tools plus AIRengineering increase output per man

8-922



Bridgeport Brass Admiralty tubes are the heart of the Prop-R-Temp Heat Pump of Typhoon Heat Pump Company, a Division of HUPP Corporation.

HEAT PUMPS PROVE THE DEPENDABILITY OF

This remarkable Prop-R-Temp Heat Pump, a product of Typhoon Heat Pump Company , Tampa, Florida, heats, cools and dehumidifies. A key part of this unit is the tube-in-tube condenser coil which transfers heat from water to refrigerant, or reverse. This unique circular or rectangular coil consists of six ⅜" O D Bridgeport Admiralty tubes nestled inside a larger, 1¾" O D Admiralty tube. The six smaller tubes are inserted into a straight length of larger tube and then coiled or bent on blocks of various radii. This fabricating method requires closely controlled physical properties of tube to avoid distortion. The length and number of coils—whatever their size—is subjected to a test of 1,000 lbs. pressure before being accepted for application.

Years ago, trouble was frequently experienced due to copper tube failure or excessive scaling caused by highly corrosive waters in certain localities. This failure was costly since,when it occurred, it was necessary to replace the entire condenser.

Bridgeport came up with the answer—Admiralty tubes. Since the switch, over 1,000 Typhoon heat pumps have gone into service without one instance of tube failure due to corrosion in sizes varying up to 1,000,000 BTU's.

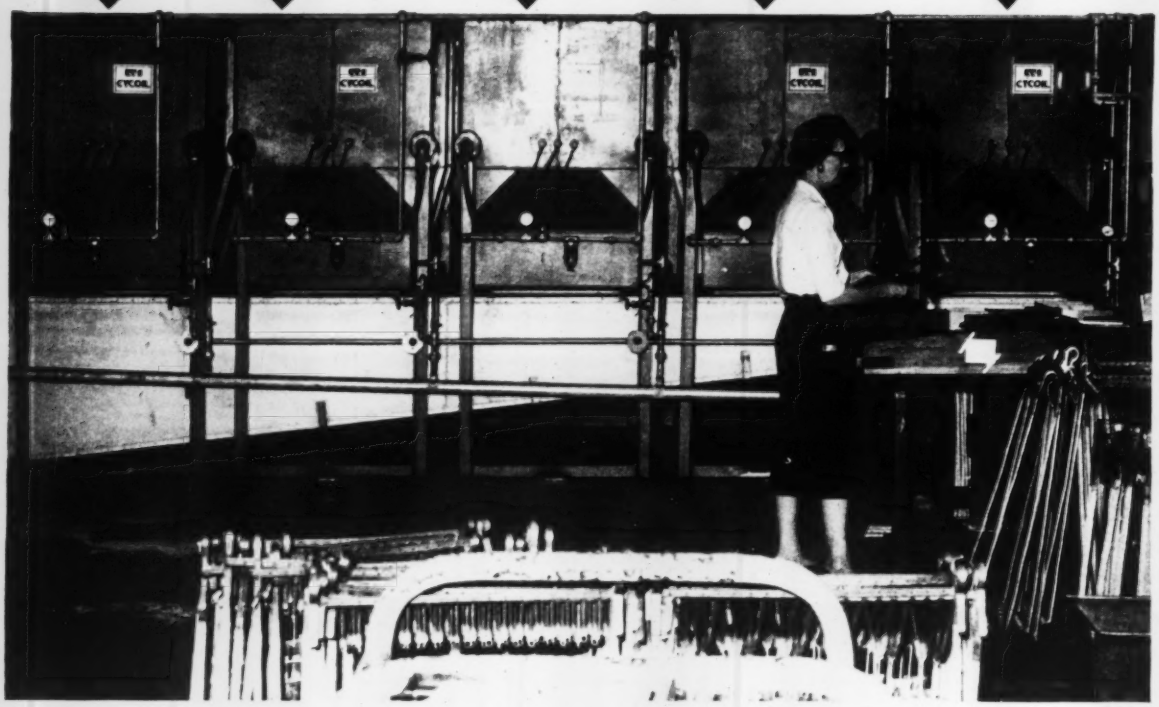
Here again is an example of how *standard* Bridgeport alloys overcame *special* fabricating and corrosion problems. It's also an example of why it pays to take advantage of Bridgeport's outstanding metals know-how. Call in the Man from Bridgeport, today. There's a Sales Office near you. Or write to Dept. 3909.

BRIDGEPORT BRASS COMPANY

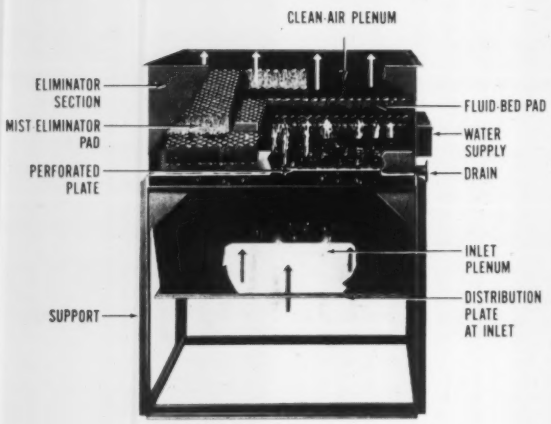
Bridgeport 2, Connecticut • Sales Offices in Principal Cities

Specialists in Metals from **A***luminum to* **Z***irconium*

NEW WAY TO STOP PLATING FUMES!



AAF Type M Cycoils eliminate fumes from small parts plating at Burroughs

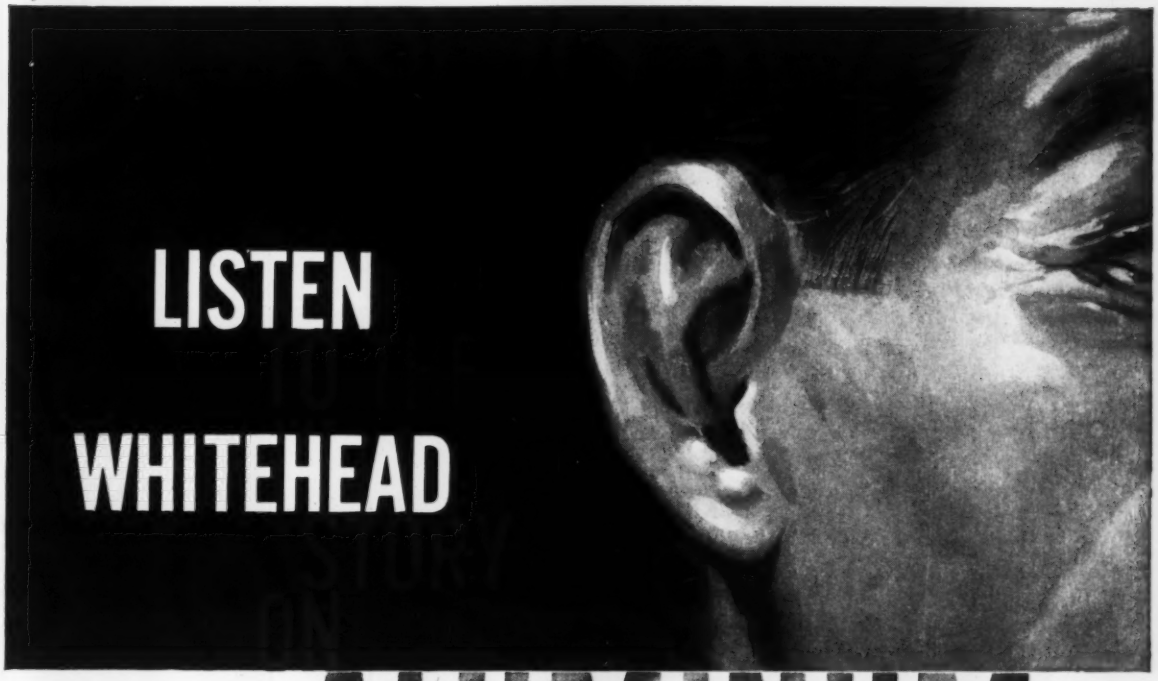


Burroughs had a fume problem resulting from inadequate make-up air and heavy fume loading from tank agitation. Their answer: a ventilating system built around new units designed *specifically for plating fume collection*—AAF Type M Cycoils.

The Cycoils achieve higher collection efficiencies than conventional collectors—yet are *lighter, less bulky* and *lower in cost!* For more information on the Type M Cycoil, call your local American Air Filter representative, or write direct for Bulletin 286. Address: Mr. Robert Moore, American Air Filter Company, 443 Central Avenue, Louisville, Kentucky.

AAF **American Air Filter**

BETTER AIR IS OUR BUSINESS



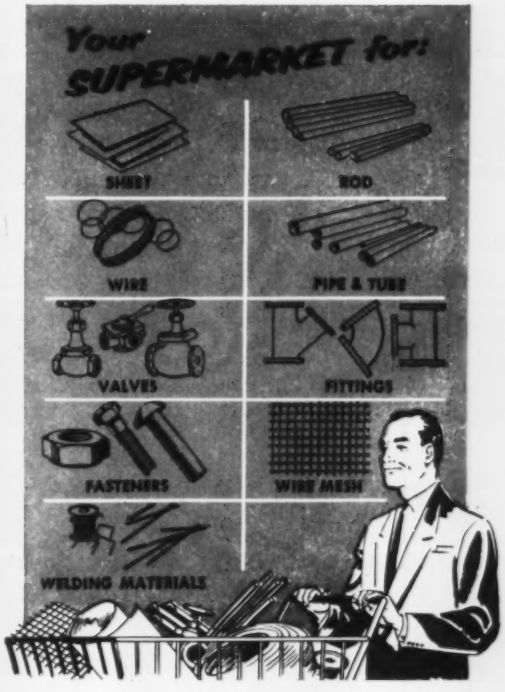
ALUMINUM

Full and complete stocks—
Technical help to meet your needs

The Whitehead service story on Aluminum is unusual. It accommodates the engineer who requires technical help in the planning stage. Then, too, the manufacturer or fabricator who requires the supplementary items—welding rod and fasteners to go with sheet; fittings and valves for the pipeline; etc. Truly a one-stop service from Alcoa's largest distributor in metals and technical help in the East.

Stocks of over 700 sizes of rod, pipe and tube; almost 500 items of sheet; thousands of fasteners and even 18 sizes of a specialty item like tool and jig plate, make Whitehead a true "Supermarket" of aluminum, no matter what your requirements.

Since we stock all the principal corrosion resistant materials—Copper Alloys, Brass, Bronze, Clad Metals, Stainless Steel, Monel, Inconel and Plastics, too—we can and do give unbiased opinions on the right material to do the job. Anytime you need anything in the corrosion resistant line, you'll find it pays to call Whitehead first.



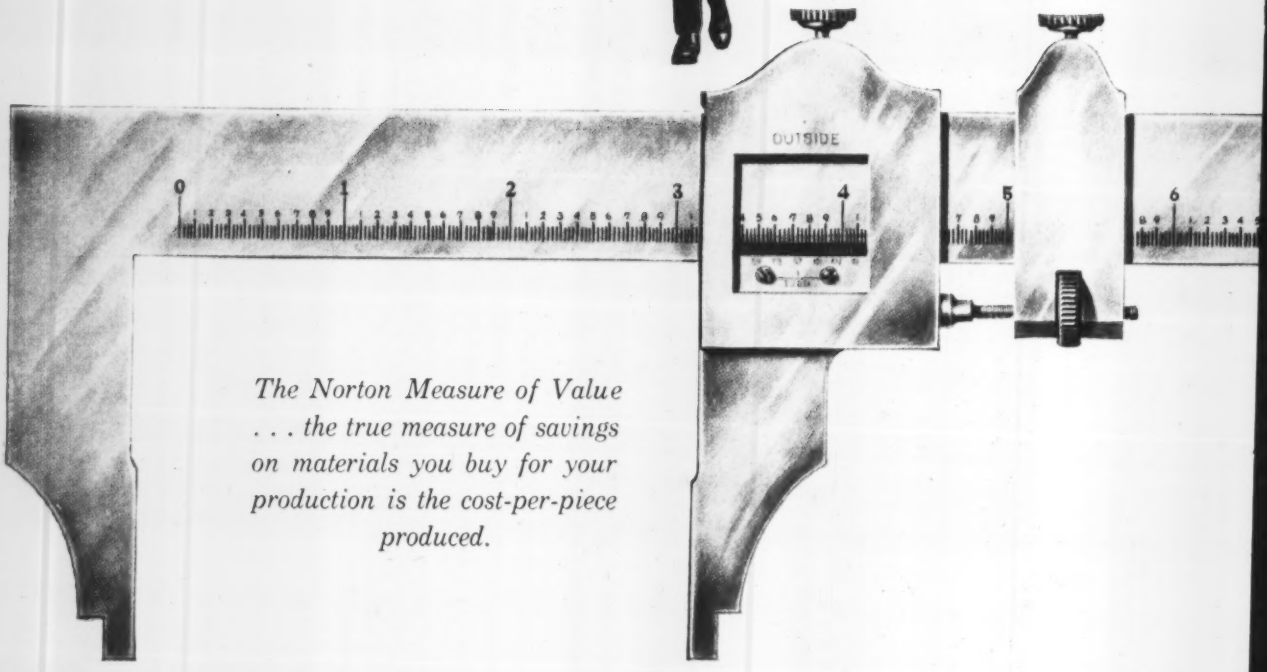
Call WHITEHEAD METALS *First!*

WHITEHEAD METALS, INC.

303 WEST 10th STREET, NEW YORK 14, N. Y.

Other offices and warehouses: **PHILADELPHIA • BUFFALO • HARRISON, N. J. • CAMBRIDGE, MASS. • SYRACUSE • BALTIMORE • ROCHESTER • WINDSOR, CONN.**

Call your Norton Man — he has the experience, the products, and knows how to save you money where it counts. There's a Norton expert in the fields of — abrasives, grinding machines, refractories.



The Norton Measure of Value . . . the true measure of savings on materials you buy for your production is the cost-per-piece produced.

Economists could argue the definition of the value of a grinding wheel in many ways. But it would usually come down to this — What is it worth to the purchaser.

You can buy less expensive grinding wheels than Norton wheels and save on immediate cost. But if the lower cost wheels do not perform their jobs efficiently or cause production delays because of poor quality or wheel misapplication — you haven't made a bargain — you've made a costly mistake.

The only accurate measure of the value of a grinding wheel is how much it produces for you per dollar cost — not merely how much you paid for it. Here is why Norton grinding wheels are worth more to you —

Norton Company gives you the most advanced research engineering and manufacturing facilities in the entire abrasive field — and you get this great scope of detailed knowledge on a personal basis — your Norton Man.

Every Norton Man starts his career by spending a minimum of one year in a carefully planned training course in the Norton plant and a comparable period of training in the field to assure a broad, thorough understanding of grinding before he goes "on his own." The average experience of all Norton Men in the field is 15 years in addition to their specialized training. The Norton Man is the most knowledgeable man in abrasives that you can consult. Make him your consulting abrasive engineer.

He will make an Abrasive Requirement Study for you.

You can produce greater savings than you can buy

This study lists the correct specifications for each abrasive job in your plant to assure you lowest cost-per-piece produced. He is also available for complete field testing on specific problems.

For example, your Norton Man can increase production by pointing out ways for better wheel usage and fewer wheel changes. He has the widest selection of grinding wheels in the industry from which to select the best wheel for new product grinding operations and for improving your current grinding jobs — both at the lowest cost. And with Norton grinding wheels you can be sure of precise duplication order after order.

Norton offers true abrasive economy. Economy that pays off in lower cost-per-piece produced. Call your Norton Man. NORTON COMPANY, General Offices, Worcester 6, Mass.

W-1893

NORTON
ABRASIVES

Making better products... to make your products better

Tubing shaped to New Ideas

Many people think of tubing only in its most common form—round. As design engineers and buyers, you know it can be produced economically in a large variety of unusual shapes. But have you ever seen the particular shapes illustrated on this page? They are samples from production runs formed to extremely close tolerances to satisfy specific design requirements. End uses include Bourdon springs, surgical instruments, batons, aircraft structural parts, gun drill shanks, radar screens, door latches, electrical equipment, antennas, golf club shafts, fishing rods and bushings. However, we don't know where all the different shapes are used, or why they are required. But our ability to form them saves manufacturers in many industries considerable time and money in the fabrication of their products.

Superior regularly produces shaped tubing in many analyses of stainless steel, carbon and alloy steels, nickel and nickel alloys, and glass sealing alloys. Also in titanium and beryllium copper. Shaped tubing is generally supplied in the as-formed temper (annealed before shaping), but many special tempers can be supplied.

We can probably supply your requirements at low cost, in good time. Data Memorandum No. 17 gives full details about Superior Shaped Tubing. Write for a copy today. Superior Tube Company, 2005 Germantown Ave., Norristown, Pa.

Superior Tube

The big name in small tubing

NORRISTOWN, PA.

All analyses .010 in. to ⅝ in. OD—certain analyses in light walls up to 2½ in. OD

West Coast: Pacific Tube Company, Los Angeles, California • FIRST STEEL TUBE MILL IN THE WEST

...ed and built by . . .

UNITED®

HIGH SPEED
5-STAND
TANDEM COLD MILL

UNITED
ENGINEERING AND FOUNDRY COMPANY
PITTSBURGH, PENNSYLVANIA

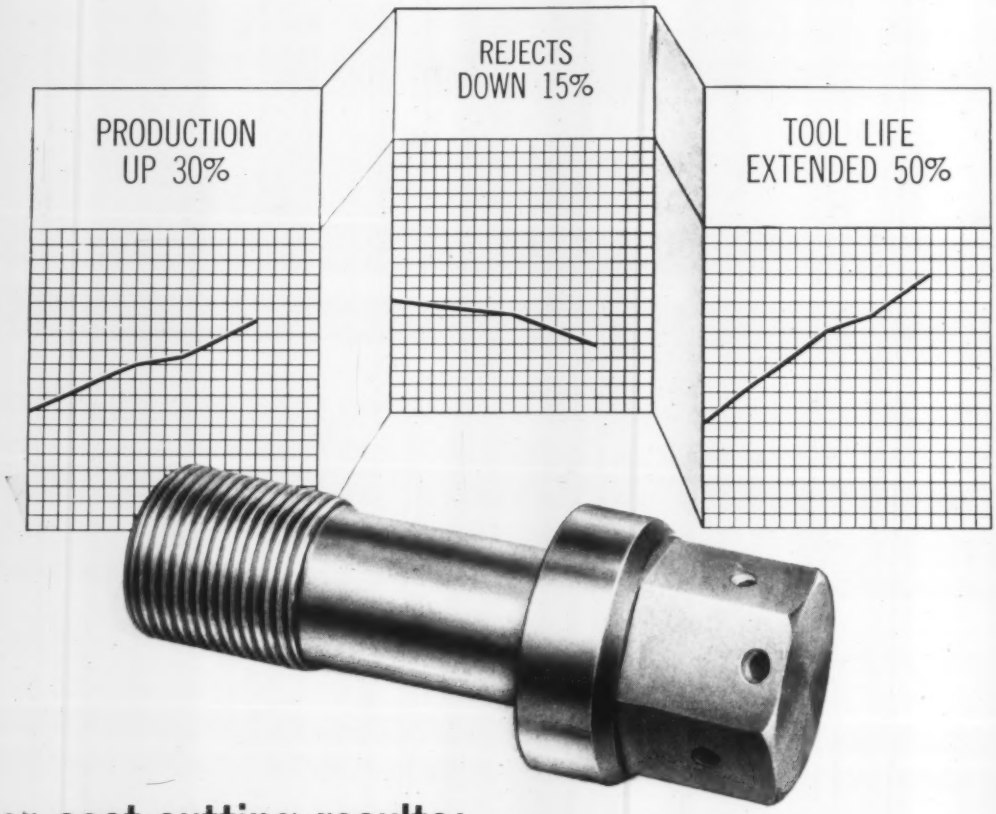
Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

Value analysis boosts production 30%

This was the outstanding result when a metalworking company studied and evaluated production of piston pin bolt heads with a Ryerson representative. The Ryerson specialist recommended Rycut® 40—the world's fastest machining alloy steel in its carbon range.



Other cost-cutting results:

In addition to boosting production, this risk-proof Ryerson alloy reduced rejects 15% . . . increased tool life 50% . . . and gave parts a better finish. Ryerson value analysis of materials and methods may help solve some tough problems for you. Contact your nearby Ryerson plant for details.

RYERSON STEEL®

Member of the INLAND Steel Family

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

NATION'S MOST COMPLETE SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST

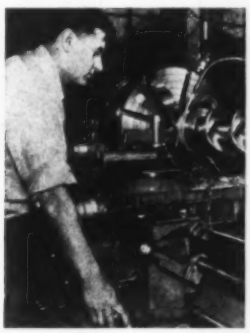
Stocks Still High as Strike Drags On

Customer inventories of steel will be adequate for at least three more weeks of normal operations. In some cases, stocks will last much longer—witness the mass of coiled rod at a fastener maker's plant (picture). Workers are still living off their last pay checks, savings, and, in Ohio, recent retroactive SUB payments. So neither workers nor users have pressured for a settlement yet. But the government is edging farther into the act, bringing pressure to bear where it can. Still, the steel bargainers haven't moved from their earlier positions—although $1.4 billion has been lost directly in 27 days of the strike (Page 77).

Here's Pattern for Labor Agreements

It pays to watch the trend of labor agreements in the Cleveland area: The sector serves as a barometer for the pattern that develops throughout industrial states. Today, the average Cleveland manufacturing employee earns $2.49 an hour. He commonly gets $1000 to $2000 worth of company-paid life insurance. His Blue Cross hospitalization is paid by the company in nearly half the cases; about one-third of the firms have plans where the cost is shared. He's commonly getting a seventh paid holiday now, and this year, he'll get his longest vacation yet. More than half the companies grant 15 days' vacation after 15 years' service; half grant ten days after five years. Those are findings of a new Associated Industries of Cleveland survey.

Machine Tool Orders to Bound Up 24%



That's how many more dollars metalworking will spend for metal cutting machine tools in the second half of '59 vs. the first half. It means second half orders will hop up to $263 million from $211 million in the first half. That brings total 1959 orders to $474 million vs. $233 million last year—an increase of more than 100 per cent. Prices are beginning to firm and some builders plan to hike their quotations before yearend (Page 92). It's another article in STEEL's series on the outlook for capital equipment.

Boost for Depreciation Reform

Expect depreciation reform efforts to get a lift from a surprising source, the U. S. Army. A report on the service's machine tool practices, prepared by Johns Hopkins University, is nearly completed. A major point of the report will be that one reason for lack of production mobility in the U. S. is poor

depreciation policies. STEEL will report on the study as soon as it's released; the conclusions are being written now.

Rails Push for Depreciation Reform

Robert A. Carr, chairman, Railway Progress Institute, told a House subcommittee that railroads need permission to write off investments faster. He said, in event of an emergency, the railway supply industry could produce 115,000 freight cars a year (three times the '58 output), 3000 diesel locomotives (vs. 434 in '58), 750 to 1000 passenger cars (three to five times more than in recent years), and double the amount of other supplies and facilities bought by the rails.

How IAM Counters Trends, Gains Members

The International Association of Machinists, born in a roundhouse in 1888, claims 925,000 members today. It has almost doubled its membership since 1949, while that of other unions has tended to be static. Labor observers call it a "good, responsible union," headed by a "reasonable guy," Al Hayes (picture). But it's a tough union: It seldom strikes, but seldom loses when it does. It's a rich union (assets exceed $21 million). You'll want to keep your eye on it late this fall when it starts bargaining with the aircraft industry. It'll go into negotiations allied with the UAW (Page 79).

What Are Steel Industry's Supervisors Doing?

They're taking vacations, going through training programs, and planning for next year's business, STEEL found in a tour of several steel company offices last week. Many whitecollar workers are engaged in catch-up jobs. No layoffs or salary reductions have been reported yet.

Attention: Slide Rule Haters

If you've ever heard instrument engineers talking, you may have turned expecting to find either beatniks or blue sky academicians. Their vocabularies run through "dead zone" and "transfer lag" to "proportional-plus-reset-plus-rate." But here's a way to dig their sounds: Imagine you're a tightrope walker. As you drift to left or right, you use the pole as a counterbalance. It's the same principle as floating control instruments. To go on a tightrope journey through the language of controls, see Page 130.

Where Does Aluminum Go?

Here's where last half, 1958, shipments of wrought products went, the Aluminum Association reports. Figures in parentheses are for last half, 1957. Construction—22.7 per cent (22.3), consumer durable goods—9.6 per cent

(9.1), transportation—14.7 per cent (15.8), electrical—9.3 per cent (10.2), nonelectrical machinery and equipment—3.7 per cent (4), packaging—7.9 per cent (8.3), distributors and jobbers—16.4 per cent (15.1), exports—0.8 per cent (1.5), other—14.9 per cent (13.7).

Fiber Metallurgy: It Challenges Your Imagination

Watch for a new class of porous metal products that have high strength and permeability, and for a new series of composite materials such as plastics, ceramics, and soft metals reinforced by fiber metal networks. The secret: Fiber metallurgy. The developer: Armour Research Foundation. The process: A combination of papermaking and powder metallurgy techniques. The implication: A whole new series of materials with potential applications so diverse that they challenge your imagination (Page 126).

Electrical Appliance Sales Leap

Unit sales of major electrical household appliances in 1959's first half were 26 per cent greater than those of 1958's first six months. The National Electrical Manufacturers Association reports these sales figures: Refrigerators —1,866,300 (vs. 1,485,000 in 1958's first half), freezers—653,000 (vs. 493,600), ranges—848,900 (vs. 644,000), water heaters—432,400 (vs. 397,500), dishwashers—254,700 (vs. 184,100), waste disposers—350,400 (vs. 282,700).

Gas Appliance Sales Climb Too

Unit sales of gas appliances this year will exceed those of last year by 10 per cent. The 1960 volume will be at least 3.8 per cent better than this year's. That's the finding of a survey conducted by the Gas Appliance Manufacturers Association. The survey predicts these sales figures: Ranges—1,074,500 in 1959's second half (vs. 1,033,000 in 1958's last half), water heaters—1,468,300 (vs. 1,337,200), warm air furnaces—621,100 (vs. 533,400), incinerators—21,200 (vs. 29,000).

Good Year Seen for Refractories—Despite Strike

Refractory shipments were at a near record pace in 1959's first half. The full year will rank among the best in sales, although the steel strike is slowing third quarter requirements. Expect 1959 volume to approximate $456 million (vs. $380 million last year). Volume is influenced chiefly by the trend in steelmaking operations. But it's stimulated by growth in the petroleum, petrochemical, and glass industries (Page 163).

One Man Will Smash Aircraft

The Redeye missile, designed to be fired by one man from his shoulder to destroy low flying planes, will come off the drawing boards. Convair Div.,

General Dynamics Corp., nailed down a $6 million contract to develop it for the Army. It will have an infrared "heat seeker" in its nose to guide it to its target. Weight: About 20 lb.

How To Fail in Business

Want to go out of business? It's easy. There are 28 sure-fire ways listed on Page 82. All have one origin—poor management. Some are not causes; they're symptoms. Take a ruinous inventory position, for example. It might be traced back to poor sales forecasting which may have resulted from faulty evaluation of a product's potential, or from failure to observe changing market conditions. Most troubles can be spotted early, if you know how.

Construction Maintains Its Record Pace

Private housing starts during this year's first half totaled 689,600, a seasonally adjusted annual rate of 1,360,000—a record pace. July heavy construction contract awards of $2.5 billion came close to setting a new record for the month, reports *Engineering News-Record*. The Commerce Department reports that total value of work put in place during 1959's first seven months was $30.1 billion—15 per cent ahead of the like 1958 period.

But It's Not Enough, Says Builder

Carl T. Mitnick, president, National Association of Home Builders, notes that today's house production is only 89 units per 10,000 persons vs. 111 per 10,000 in 1950. He reports "strong indications that tight money will have a seriously depressing effect on housing production next spring."

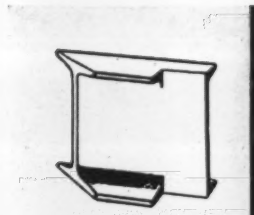
Here's a Big Construction Market

The Council for Financial Aid to Education surveyed 820 colleges and universities. It found that they'll spend more than $6 billion for plant and equipment during the decade from 1957 to 1967. It means this is a $600 million annual market—worth investigating if you supply builders.

Straws in the Wind

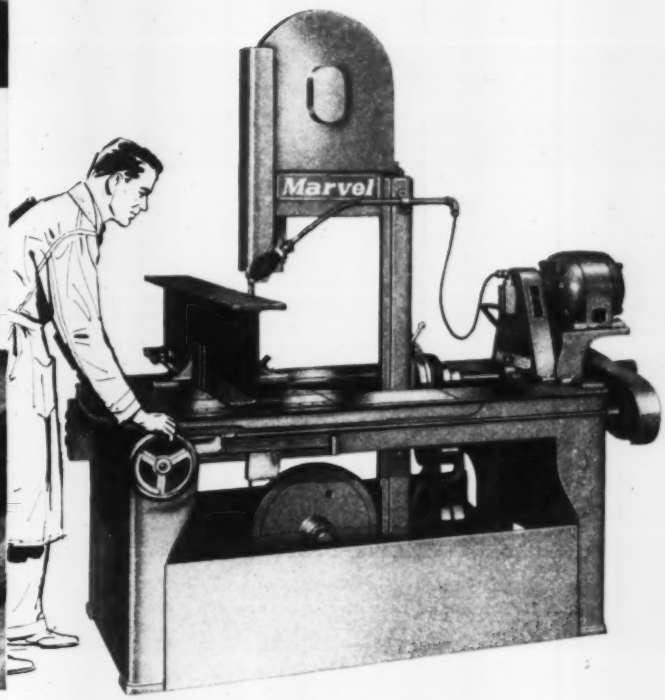
Expect 1959 farm machinery sales to come within $200 million of the industry's record, $1.9 billion, set in 1951 . . . You can now buy manmade diamond abrasive products at the same price as natural diamond products . . . Hotpoint Co., a division of General Electric Co., is spending $10 million to replace unsatisfactory laundry appliances sold in 1955-57 . . . Cleveland entered a new shipping era last week when a vessel carrying 2000 tons of aluminum arrived from Kitimat, B. C., via the Panama Canal and St. Lawrence Seaway . . . Shipping delays at the Welland Canal may lead to establishment of a steelmaking facility at Contrecoeur, near Montreal . . . Herbert Herz, president, Magnetic Amplifiers Inc., predicts that industry sales of magnetic amplifiers (the high power counterpart of transistors) will soar to $2 billion by 1970 vs. about $125 million this year . . . Consumers added $452 million to their installment debt in June—the biggest gain since September, 1955.

"The One Machine We Couldn't Do Without"



COPING AND MITERING HEAVY STRUCTURAL SHAPE

18" Beam (above) is held between vises for the short cut. On the long cut (left) vises were removed and beam held by simple clamp. The MARVEL Band Saw is truly indispensable in ornamental and structural iron shops where this type of work is done daily. The machine will cut-off square, miter and cope any work shape from the smallest moulding to 18" I-beams.



SPLITTING CLAMP RINGS, BUSHINGS

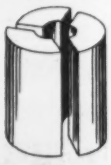
Splitting clamp rings, connecting rods, bushings and collets is a fast, simple operation on the No. 8 Band Saw. Perfect control, quick chucking facilities, accuracy and speed are features that especially fit the machine to handle this type of work.

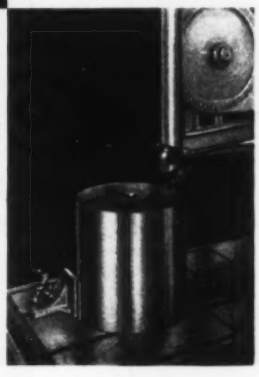
MITERING LARGE DIAMETER PIPE

Pipe (or any bar shape) may be mitered at a 45° angle without the need for special jigs or fixtures. Even when cutting miters, work remains in the same position as it does for straight cuts. Column and blade are instantly tilted to desired angle, even without stopping the machine. Perfect miters (or lesser angles) are sawed without any layout or special equipment.

SEGMENTING LARGE DIE BLOCK

Three equally spaced re-entrant cuts were made in this 16" x 18" SAE 4130 Forging. Job was completed, floor-to-floor in 5 hours. No special jigs or fixtures were required. An unusual job that serves to emphasize the versatility of the MARVEL No. 8 Saw.





"As simple to use and handy as a Scout Knife" is the way another user described his MARVEL No. 8 Universal Band Saw recently . . . and we can't think of a better way to describe this versatile metal cutting machine.

With a MARVEL No. 8 Band Saw, you can do almost any conceivable straight, angle, or miter metal sawing job—from cutting-off bar stock to making the most unusual forming cuts. You can handle small, delicate work, and in the next minute, saw structurals, or segment large work as illustrated in the lower photograph. You will save time, labor, and material with a MARVEL No. 8 Band Saw because no other saw has all the features to be had in this truly universal tool.

Upright column design and forward travel of the blade through the work (which remains stationary on the table-height saw bed) provides easy, unobstructed visibility and more convenient and efficient working conditions; column can be tilted and locked at any angle up to 45° left and right of vertical; the exclusive MARVEL Power Feed with Automatic Overload Relief; Automatic cutting-depth stops; simple, convenient operating controls—these are some of the features which make the No. 8 Band Saw the most useful—and used—metal cutting saw on the market.

For the complete story, ask or write for Bulletin 875 which illustrates and describes MARVEL Universal Metal Cutting Band Saws.

MARVEL *Metal Cutting* **SAWS**

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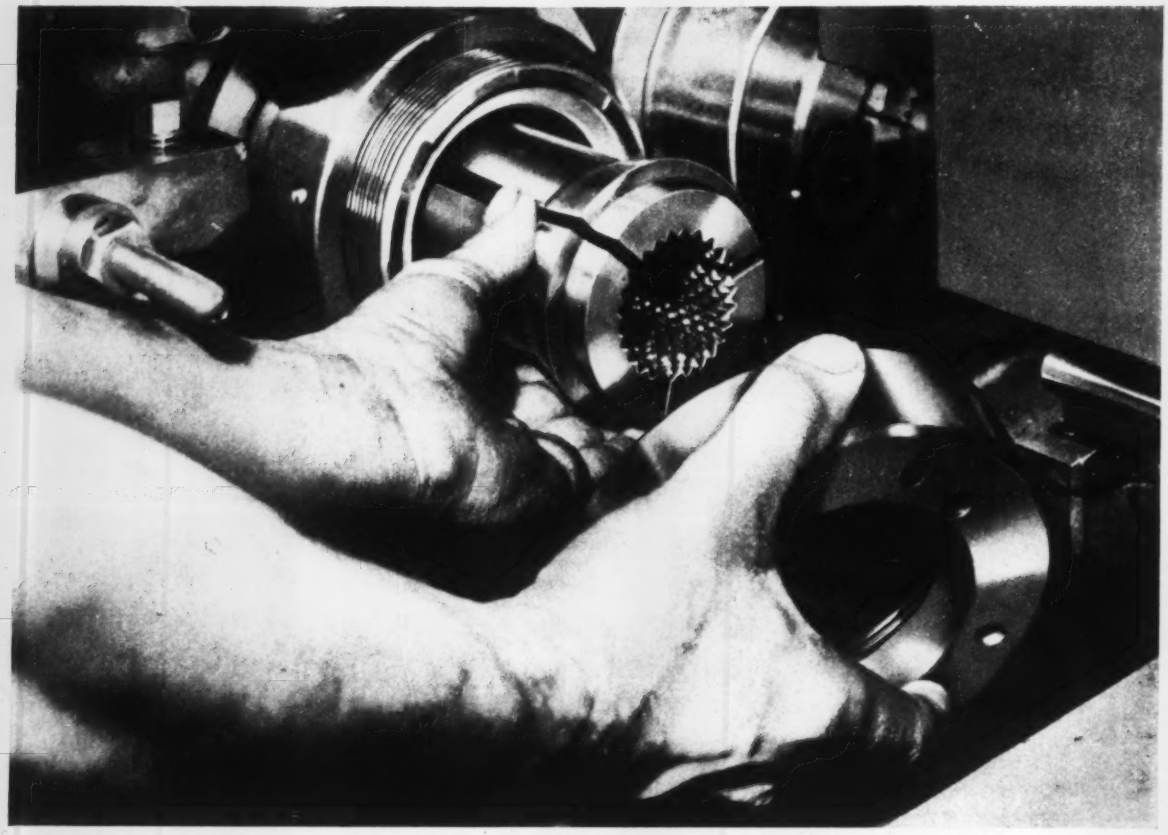

Inspecting 4615 nickel alloy steel spindle in Greenlee 6-Spindle 2" Automatic Bar Machine assembled with collet and 4615 steel spindle nose nut. Greenlee Bros. & Co., Rockford, Ill., also produces 1" and 1⅝" bar machines.

How Greenlee uses two general purpose nickel alloy steels to keep precision machines precise

1...case-hardening 4615 for wearing parts 2...through-hardening 4340 for stressed parts

Do you know that by varying heat treatment of just two nickel alloy steels – 4615 for case-hardening, 4340 for through-hardening – you can give desired hardness and strength to most heavy-duty machine tool parts?

For proof – consider the Greenlee 2-inch automatic bar machine above.

Each spindle is 4615 steel, carburized and hardened to Rockwell C 62-64. The hard case holds down wear or loss of running accuracy, even though spindles turn directly on 5 speed ball bearings. High speed torsional stresses are taken in stride by the tough, strong core. The low distortion characteristics of 4615 steel during heat treatment help to keep true-running accuracy.

4615 steel also gives the same excellent wearing qualities in spindle nose nuts, idler gears, bushings and sleeves.

4340 steel strengthens highly stressed parts

Through-hardening 4340 nickel alloy steel is the off-the-shelf steel Greenlee uses for heavily stressed parts – for example, certain shafts heat treated up to 225,000 psi tensile strength.

Stocked in Steel Service Centers across the country

Versatile 4615 and 4340 nickel alloy steels are available for quick delivery from Steel Service Centers throughout the country . . . ask us for a list of centers where you can buy them. Write us, too, for specific questions concerning these two steels.

THE INTERNATIONAL NICKEL COMPANY, INC.

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INCO NICKEL

NICKEL MAKES ALLOYS PERFORM BETTER LONGER

Steel Truce for Khrushchev?

The forthcoming exchange of visits between Nikita Khrushchev and President Eisenhower throws a new and previously unsuspected element into the steel strike negotiations that you should consider in your own planning.

Any U. S. President in his right mind would not want the Soviet boss to visit his country with an eight-week steel strike beginning to affect all industry.

So it is reasonable to expect that President Eisenhower will accomplish one of these objectives between now and Mr. K's arrival Sept. 15:

1. Exert enough pressure on both the companies and the United Steelworkers from behind the scenes to force a settlement, as he did in 1956.

2. Call for the 80-day cooling off period provided in the Taft-Hartley Act that would force resumption of steelmaking until the first week in December.

As of today, it seems unlikely that the President will accomplish his No. 1 objective.

David J. McDonald, USW president, says he wants more than the 62½ cent wage and benefit package he got in 1956. He also has in mind a shorter week to spread the work among people he says were displaced in the 1958 recession.

The steel industry, on the other hand, insists that it will not go along on wage increases that would contribute to inflation.

Since the steel industry sets the pattern for wages and prices in many other industries, steel industry management shoulders a tremendous responsibility.

Accusations by the USW that the industry can afford to pay exorbitantly higher wages without raising prices are so much nonsense. High profits in the first half of 1959 are explained by the simple fact that the industry was obliged to do nine months' business in six months.

The President himself opposed an inflationary settlement when he asked the industry and the USW to bargain so that the price of steel is not "compelled to go up."

In this setting, the chances for an agreement by Labor Day seem slim.

So it is not unrealistic to figure on the resumption of steelmaking during an 80-day truce—and perhaps a resumption of the shutdown in December!

Irwin H. Such

EDITOR-IN-CHIEF

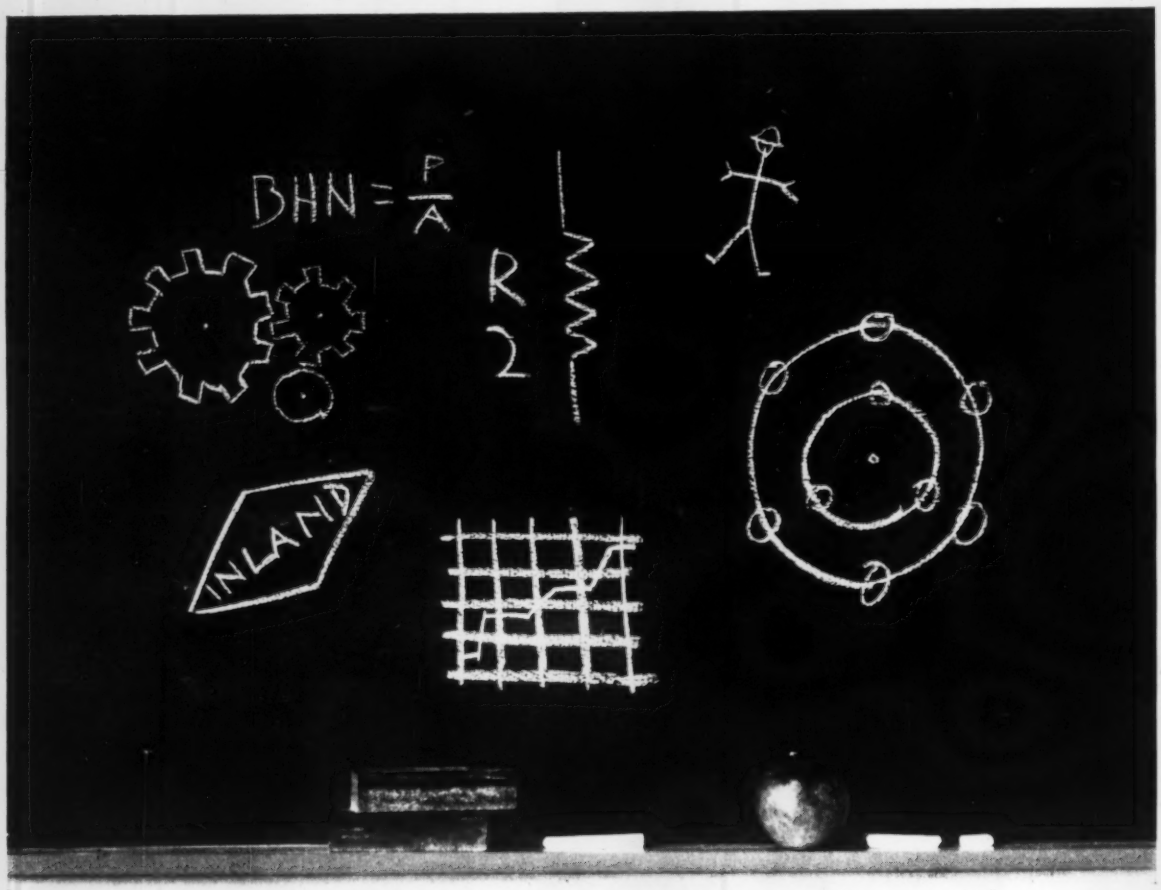
14,089 Inland employees went to school last year

Many went because they were enthusiastic about their jobs—inspired by the advancement opportunities at Inland. Others went because Inland, ever on the watch for men capable of developing their abilities, sought them out—found them—encouraged them to take the next step.

At Inland, this thoughtfully planned system of seeking for such men within the company, has now been in continuous operation for more than fifteen years. Because of it, more than 70% of Inland's supervisory staff have come up from the ranks—30% more from Inland's College Recruitment Program. Because the system encourages personal growth, the process never stops. It may begin with on-the-job training programs in which 3,842 employees participated last year. It can continue through Inland's programs in conjunction with leading educational institutions, such as Harvard, Purdue, University of Chicago and Wabash College.

With literally thousands of Inland men building their own futures, a new kind of climate is created—a climate in which men find real satisfactions in their work and the products of their labor. It results, we believe, in a growth-minded organization—a company dedicated to ever better service and products for every Inland Customer.

Building Today, with an Eye to Tomorrow



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Still Enough Steel as Strike Drags on

Russell, Burdsall & Ward Bolt & Nut Co.

$1.4 BILLION HAS BEEN LOST directly in 27 days of the steel strike. The indirect losses (see Page 99) are not great yet, but they will mount as the walkout continues.

Keeping industrial activity high is the heavy inventory of steel, still adequate for at least three more weeks of near-normal metalworking operations. Steelworkers have not yet suffered unduly. They're living on savings, final pay checks in late July, (in Ohio, only) Supplemental Unemployment Benefits.

• **Stop-Strike Pressures Mild**—Thus, two sources for stop-strike pressures —steel users and the workers—have not yet exerted great influences on management and labor to come to terms. Workers' last pay checks may have been at or near a record.

July earnings figures are not yet ready, but June saw high average hourly payroll costs—$3.339 compared with $3.346 in May and $3.113 in June last year. The average for the first half this year was $3.339 compared with $3.087 in the corresponding part of last year (an increase of 25.2 cents an hour). Not included are fringes which amounted to an average of 33.2 cents an hour in 1958 in addition to the direct payroll costs. Wage earners worked an average of 40.6 hours a week in June against 39.9 in May this year and 35.5 in June last year.

American Iron & Steel Institute reports that companies accounting for 96.3 per cent of steel capacity set an all-time monthly record in the June payroll for hourly and salaried workers—$398.2 million vs. $396.9 million in May (the previous record) and $266.1 million in June last year. Hourly and salaried employment increased to 640,920 in June compared with 634,668 in May and 510,828 in June last year.

• **Companies Hold the Line**—The

Strike Losses

(Through Aug. 10)

Lost Steelworker Wages

. . . . . $270,800,000

Lost Sales

. . . . . $798,000,000

Lost Production **(ingot tons)**

. 7,643,700

Other Losses

Overhead, depreciation, and salaries of nonproduction workers in steel.

. . . . . $152,000,000

Tax Losses to U. S.

. . . . . $180,000,000

steel industry bargainers are still holding to their position: No net increase in employment costs. They'll allow wage increases only if the union agrees to contract changes that permit operating efficiencies.

Steelmakers want to hold the line to meet competition from foreign steel producers and from domestic producers of aluminum and other materials. More than 4 million tons of foreign steel will be purchased in the U. S. this year. That's nearly 5 per cent of expected domestic shipments for 1959—equal to the combined annual capacity of these seven U. S. producers: Granite City Steel Co., Allegheny Ludlum Steel Corp., Lukens Steel Co., Lone Star Steel Co., Eastern Stainless Steel Corp., Jessop Steel Co., and Keystone Steel & Wire Co.

Bethlehem Steel Corp.'s president, A. B. Homer, has joined U. S. Steel Corp.'s chairman, Roger M. Blough, in pledging no general increase in prices after the steel strike unless compelled to make an involuntary settlement because of government intervention. Mr. Homer goes even farther than Mr. Blough and holds out the possibility of an eventual price reduction, if cost conditions warrant.

• **Union's Position** — The Homer hope is based on United Steelwokers acceptance of contract changes to permit more efficiency. The union denies any featherbedding.

It claims the companies can pay about 15 cents an hour more in employment costs per year because of "high profits."

• **Negotiations Stalemated** — With such diametrically opposed positions, negotiations got nowhere last week, even though both sides were meeting face to face more frequently after Labor Secretary James P. Mitchell chided them for shunning each other.

Mr. Mitchell is still trying to bring pressure on both sides for settlement without direct government intervention, such as invoking Taft-Hartley's 80 day cooling off period. The U. S. has intervened in every other postwar steel strike except the one day stoppage in 1955.

The secretary has launched a study to learn the underlying causes which make the current steel strike the sixth time since World War II that steel management and labor have failed to reach an agreement without a strike. The study may take as long as a year.

Three More Firms Struck

Three more steel companies were struck Aug. 1: Lukens Steel Co., Coatesville, Pa. (annual tonnage: 930,000), Northwest Steel Rolling Mills Inc., Seattle (annual tonnage: 53,000), and Pacific States Steel Corp., Niles, Calif. (annual tonnage: 216,000).

Thirty day extensions were granted Alan Wood Steel Corp., Ivy Rock, Pa. (annual tonnage: 800,000) and Heppenstall Corp., Pittsburgh (annual tonnage: 55,-550). Southwest Steel Rolling Mills, Los Angeles (annual tonnage: 45,000) received a 60 day extension.

Wisconsin Steel Div., International Harvester Co., Chicago, (annual tonnage: 1,200,000), reached a provisional contract agreement on July 29 with the Progressive Steelworkers Union (independent), averting a strike.

USW Fights Sea Union Raid

United Steelworker President David J. McDonald has demanded that AFL-CIO President George Meany call a halt to a "raid" on the steel union's membership by the AFL-CIO Seafarers International Union.

Charging the SIU with "strike-breaking" and a "blatant attack on morale and unity of strikers," Mr. McDonald asked Mr. Meany to direct the SIU to withdraw its petitions for National Labor Relations Board elections contesting the USW's right to represent Great Lakes ore boat seamen. More than 3000 ore vessel crewmen walked off their vessels after the national steel strike began.

Mr. McDonald also requested

that the AFL-CIO set up raid arbitration to settle the dispute if the SIU petitions are not withdrawn.

The steelworkers' strike, meanwhile, has brought Great Lakes ore and coal shipping nearly to a standstill. All steel company fleets have been idled, and independent shippers are having difficulty finding cargoes.

AAR O.K.'s Aluminum Cars

Welded aluminum railroad hopper cars, designed and built by Aluminium Ltd., have been conditionally approved by the Association of American Railroads for interchange service on railroads in the U. S., Canada, and Mexico.

Eight tons lighter than steel cars and with a 5 to 1 payload to deadload ratio, the all aluminum cars are being used for heavy duty hauling by Aluminium Ltd., and by the Roberval & Saguenay Railway Co. of Canada. Initially built with steel underframes, the cars can now be built with an aluminum center sill, designed to meet the requirements of the AAR.

Constructed with a special aluminum alloy and high speed welding techniques, the cars have gone through exhaustive fatigue and collision tests to show that they hold up as well as steel cars under dynamic loading.

Because of improved payload to trailing load ratios, Aluminium estimates that the R&S Railway can haul 330 fewer trainloads of bauxite to move 2 million tons by using trains with all aluminum cars.

Waterside Projects Dip

A first half downturn in the construction of industrial plants on inland waterways is attributed by American Waterways Operators Inc., Washington, to last year's recession.

A total of 168 waterside projects were started or announced in 1959's first half vs. 273 projects in the 1958 period. Nearly half the new projects will be new or additional barge loading terminals.

In the second quarter of 1959, chemical plants announced 16 new starts or expansions; building material plants, seven; and metal producing plants, six.

Copper Peace Uncertain

Consensus among trade people is that the bulk of the industry will continue to work. But it's an uneasy truce as the USW becomes more militant. Mine-Mill mum

CHANCES for labor peace in copper remain uncertain. Consensus among industry people is that while there may be some strikes, the bulk of the industry will continue to operate until a new contract is signed.

• **Tension in Copper**—As STEEL went to press last week, here's how the situation stood:

• Phelps Dodge Corp.'s Laurel Hill refinery in New York was shut down. Employees belonging to the United Steelworkers of America walked out when contracts expired July 31. Observers say one reason the union might not have granted an extension as it did to the aluminum companies was because PD wouldn't agree to make any gains retroactive to Aug. 1. It's reported the USW has never altered its position from its original set of demands and hasn't yet made a specific wage proposal.

• USW employees at Kennecott Copper Corp.'s western mining divisions, most of whom work at the big Garfield, Utah, smelter, were threatening to walk out today (Aug. 10). Last week, Kennecott offered workers a two year contract which called for a package increase of 17.9 cents an hour—10 cents in wages, the remainder in fringe benefits. Besides the wage increase, the contract included: 1. An improvement in the increment of difference in rate of pay in job grades. 2. Certain insurance improvements (in health and welfare programs). 3. Establishment of a SUB plan. 4. Elimination of a portion of the area pay differential. 5. Standardization of overtime pay, jury duty compensation, holiday pay, and sick leave benefits. The union's reaction: Not enough.

• Last Tuesday's long awaited meeting of the wage committee of the International Union of Mine, Mill & Smelter Workers brought no immediate announcement of whether or not the union had set a strike date. Many observers believed they were holding back until the Kennecott-USW dispute was settled or flared into a strike.

If the IUMMW were to walk out, it would close down 24 copper facilities and virtually paralyze the domestic industry. A strike would also seriously affect lead and to a lesser extent, zinc.

Some observers believe the Kennecott offer to the steelworkers is not too far out of line with what the Mine-Mill would accept. They have asked for: A 15 cent an hour wage increase, shift differential pay, SUB, an additional holiday, and some minor improvements. They've dropped their earlier demand for a 32 hour week and an escalation agreement.

Kennecott hasn't yet offered the same package to the Mine-Mill but observers think they will. If Mine-Mill were to accept the Kennecott package, it would probably set a precedent for other settlements. Reason: Kennecott has traditionally pretty much set the pattern in copper in the same way as U. S. Steel Corp. has in the steel industry.

• **O.K. in Aluminum**—The labor picture is as steady in aluminum as it is unstable in copper. Reynolds Metals Co. has signed an agreement similar to the Aluminum Co. of America pact. (see STEEL, Aug. 3, p. 39) with the Aluminum Workers International Union. It calls for the present contract to be extended indefinitely with all gains retroactive to Aug. 1.

Aluminum Co. of America and the United Auto Workers have signed a contract extension agreement virtually the same as the one with the AWIU. The AFL-CIO trades councils that represent two Alcoa west coast reduction plants have also agreed to an extension.

IAM Gains Members, Counters Trends

The International Association of Machinists is unique among major metalworking unions being studied by STEEL. Its president, Al Hayes (right), maintains the craft tradition and allows locals unusual autonomy. He intends to counter management's tougher bargaining attitudes with "an honest case, temperately expressed."

THE IAM (International Association of Machinists) was born in a roundhouse in 1888. Today, the biggest part of its 925,000 membership is involved in trying to send man into space.

But the IAM is still a little old fashioned in contrast with the three other major unions STEEL is covering in its series on union-management relations (IUE on July 27, UAW on Aug. 3, and the Steelworkers in a coming issue).

• **"A Good Union"**—It has never been the centralized, breast beating variety of industrial union which much of U. S. management is so familiar with. Its 2100 lodges have more autonomy than any other large American union permits. One observer says: "They are essentially craftsmen. They have a more mature outlook. They have never permitted the hotheads to take over."

The situation will continue at least until Al Hayes, the IAM president for the last ten years, reaches the union's mandatory retirement age of 65 in 1965. He had no opposition in the elections of 1949, 1953, and 1957. None is expected in 1961. Albert J. Hayes is "a reasonable guy," says an aircraft manager. "We are fortunate."

No less an authority than Victor Riesel, the labor reporter, calls the IAM an honest union. Al Hayes is head of the AFL-CIO's Ethical Practices Committee. *The Christian Science Monitor* has reported that the union is determined "to maintain a public reputation for integrity and responsibility."

• **But It's a Tough Union**—Consistency of purpose gives the IAM strength. It is not regarded as "a striking union," yet, when it does strike, it seldom loses.

Part of its strength is in its diversity: 400,000 aircraft workers (70 per cent of the aerospace industry), 100,000 auto repair mechanics, 60,000 railroad machinists, 40,000 airline workers, 25,000 bluecollar government employees, and 300,000 workers spread through metalworking (including machine tools, fabrication, ordnance, instruments, farm machinery, road machinery, airconditioning, atomics, cranes, and locomotives) and the food, tobacco, textile, lumber, paper, printing, chemical, rubber, and leather industries. It has almost doubled its membership since 1949. The membership of other industrial unions has tended to be static.

• **And a Rich Union**—Receipts ($17 million) exceeded expenditures by $2 million in 1958. Assets were over $21 million. Its defense fund came to $2.5 million.

Eric Peterson, general secretary-treasurer, evaluates the union this way: "While diversity creates some complications, it is a great source of strength. It means that cutbacks and layoffs in any one industry do not seriously cripple our activities." The IAM established its defense fund at the beginning of 1958 (perhaps in anticipation of the recession) and credits it "as an important factor in the winning of a number of strikes."

• **Important Year Ahead**—Late 1959 and 1960 will be bargaining time for the aircraft industry. It is apparent that the IAM will run into the tough bargaining philosophy now being employed by steel industry management. The union shares the aircraft industry with the UAW (United Auto Workers), which controls about 25 per cent of the 750,000 employees. Two major firms, Northrop Aircraft Inc. and

Grumman Aircraft Engineering Corp., are nonunion.

• **In Unity, Strength**—In preparation for the negotiations, the IAM and UAW conferred last week at Kansas City "to hammer out a single collective bargaining program for presentation" to the industry. The two unions have operated under a mutual assistance agreement since 1953, a pact regarded as having paved the way to the eventual merger of the AFL and the CIO. The IAM-UAW pact, originally a no-raiding agreement, has been broadened to include "mutual co-operation," says an IAM spokesman. In the case of new plants, the pact calls for organization by the union which already has the largest representation in the division. Outside aircraft, they may compete—but "less and less" as time goes on, this source says. He adds: "It doesn't mean there are no disputes. We have set up an agreement under which we can settle them." When disagreements become severe, they are settled by a six-man (three from each union) "enforcement" committee.

The IAM has ten similar agreements with other unions. Another approach to union unity has been exhibited in a joint conference of unions representing General Electric employees (IAM, UAW, International Union of Electrical Workers, and International Brotherhood of Electrical Workers).

• **The Third Seat**—In the coming aircraft bargaining, a seat is reserved for a third party, the Defense Department. One of the major problems, says the union and management, is the unpredictability of military contracts.

Al Hayes describes the issue this way to STEEL: "I sometimes think that government programing of aircraft and missile production must be an example of one of the worst engineered procurement programs in the world—worst not in the efficiency of the product but from the human point of view.

"A little ingenuity could be used to devise a plan for building missiles and planes and other defense hardware without periodically disrupting plants, scattering the employees to the four winds—then a few months later, mounting a new recruiting campaign, asking the same people to come back and do it all over again."

• **What the IAM Wants**—Severance pay and improved apprenticeship programs are high on the list of improvements wanted by Mr. Hayes. A settlement at Avro Ltd. in Canada indicates what the IAM is after in severance pay: Workers get $10 a week for a number of weeks, depending upon the situation under which they are laid off. "The principle of severance pay," says the IAM, "is more important than the amount of dollars, in view of the trend to short run production and long tooling time in the industry." The IAM does not seek Supplementary Unemployment Benefits or the Guaranteed Annual Wage because it admits that the industry's business in inherently cyclical.

• **Another Problem**—Mr. Hayes told STEEL: "Russia is succeeding broadly in its program of training craftsmen in addition to scientists and engineers. Today, our country is letting its reservoir of skilled craftsmen run out with the same profligacy evidenced when we wasted our other natural resources." He agrees with the Labor Department that we are losing 150,000 skilled workers a year and believes "the problem will become more acute with increased mechanization and automation because the demand for all-around journeymen is increasing, not diminishing." He wants the Pentagon to direct every defense contractor to "train his quota of journeymen." He charges: "Many aircraft companies still rely on pirating."

The IAM allows one apprentice for every ten journeymen. The actual ratio in aircraft is "easily only 1 to 30," claims IAM. New skills needed in areas like electronics and inspection make the situation worse.

Pensions are relatively new in the aircraft industry. They are certain to come up in bargaining. The industry is among the major ones left without a union shop, but the IAM doesn't expect much immediate change there. Mr. Hayes's long range goal: "All plants in the industry will be unionized . . . there will be general uniformity in wages and working conditions." Presumably he will fight hard to win those objectives before his retirement.

• **Wages Remain Sore Spot**—The average aircraft worker, says an industry source, makes $2.59 an hour, but the union claims that is a gross figure, including overtime. The Steelworkers' request for a 15 cent an hour boost is probably a good guide to what the IAM and UAW agreed to last week.

Each company, in many cases each division, does its own bargaining. Location governs some significant variations in contracts. Pay gains in the first quarter of the year for IAM locals (mostly outside aircraft) averaged 11 cents an hour, says the union.

The union is pleased with a contract at Lockheed Aircraft Corp. Men willing to move to a new missile plant received moving expenses and per diem while traveling. It is a first.

• **Whitecollar Trend**—In 1950, salaried employees made up 25 per cent of aircraft employment. Today, 37 per cent wear white collars. Few are organized, but the IAM hopes to establish more "office and technical" units like it has at Lockheed, General Dynamics Corp.'s Convair Div., and Douglas Aircraft Co. Inc. The union maintains no central whitecollar organizing group. Each region does its own surveying of potential growth areas.

Major Aircraft Contract Terminations

Sept., 1959	Curtiss-Wright	UAW
Oct., 1959	Fairchild (Hagerstown, Md.)	UAW
Dec., 1959	Pratt & Whitney Div., United Aircraft	IAM
Feb., 1960	Sikorsky Div., United	UAW
Mar., 1960	Chance Vought	UAW
Apr., 1960	United Aircraft	IAM
Apr., 1960	Republic	IAM
Apr., 1960	Boeing (Seattle)	IAM
May, 1960	Douglas	UAW
May, 1960	Convair Div., General Dynamics	IAM
May, 1960	Lockheed	IAM
May, 1960	North American	UAW
June, 1960	Douglas	IAM
June, 1960	Rohr	IAM
June, 1960	Solar	IAM
June, 1960	Boeing (Wichita)	IAM
July, 1960	Ryan	UAW
July, 1960	Martin (wages only)	UAW
Sept., 1960	McDonnell	IAM
Nov., 1960	Hiller	IAM

Source: Labor Department, IAM.

28 Ways to Go Out of Business

IT'S EASIER to go out of business. The list on the next page shows you the common ways. Many others are equally effective. They all have one origin—poor management.

• **Technical Savvy Not Enough**—E. S. Schofield, chief engineer for Profit Counselors Inc., New York, puts it this way: "A company can have a good product, good price, good market and still wind up in bankruptcy proceedings because its management couldn't run the business. All the technical savvy in the world won't mean black ink without management knowhow."

Mr. Schofield cites this example: "We had a metalworking client who, in half a century, had become a sizable supplier of components to the boat industry. His products were top quality, his prices competitive, and his market increasing. Unfortunately, while plant facilities and manufacturing methods kept pace with rapid industry developments, management left its accounting and control function in basically the same outdated form as when the business was founded. Suddenly, it found itself faced with a $500,000 tax claim because of an accountant's error in interpreting inventory valuation and depreciation schedules. Fortunately, as a result of revamping its accounting and control system to come up with some right answers, the client escaped a potentially ruinous situation."

Or take this case from the files of the Small Business Administration: A metalworking firm became involved in a complex problem of depreciation which stemmed from the writeup of certain assets when they were transferred from a predecessor partnership to the company. After several years, the government challenged the depreciation charges. Litigation dragged on for years. Eventually, the company had to liquidate to pay a tax claim of $300,000.

• **Causes Are Interrelated**—Most troubles, like the 28 listed, rarely occur by themselves. They may be symptoms rather than causes. For instance, a ruinous inventory position might be traced back to poor sales forecasting which in turn resulted from faulty evaluation of a product's potential or failure to observe changing market conditions.

Example: A manufacturer's sales were rising but profits weren't going up in proportion. Increased production was hiking costs. Management decided to analzye its unit costs of marketing and compare them with related sales and gross margins for different segments of the business (something it should have been doing all along). It learned: 98 per cent of its sales were coming from only 22 per cent of its customers; more than three-quarters of its marketing efforts were being wasted.

• **Failures Mount**—That company was fortunate. Not all are able to solve their problems in time. Dun & Bradstreet figures show that failures are steadily mounting. Last year, 14,964 firms with total liabilities of $728,258,000 went into bankruptcy. It wasn't just the younger firms that had trouble, either: 21.4 per cent had been in business over ten years; another 21.4 per cent had been operating six to ten years. As Robert Trundle, president of Trundle Consultants Inc., Cleveland, puts it: "You can become technically obsoleted so fast that a wrong decision today can put you out of business a year from now."

• **Preventive Medicine**—Most troubles can be spotted before they become serious. You can set up safeguards for every potential danger area. For example, you might make it a practice to commit only a certain percentage of your production to any one customer.

It's a good policy to check periodically on where you stand. Do you have adequate equipment? How old is it? Are you putting adequate replacement funds aside? Do you have qualified men to step into management should someone retire or become incapacitated?

G. R. Andlinger, associate of McKinsey & Co., New York, suggests that management determine the critical factors to success in its

industry. To determine them, decide what you must do well to succeed.

After you've decided what's critical, set up standards. Then, develop plans and programs to achieve your goal. Include, says Mr. Andlinger, a way to judge your performance.

• **Helping Hands**—There's no substitute for staying out of trouble but once you're in hot water all may not be lost. You can turn for help to professional and trade associations, consultants, the government, your own community, venders, customers, your bank.

Here's how a lending institution, James Talcott Inc., New York, was able to help one of its metalworking clients. The symptom: The company was borrowing a lot of money, making only a small profit. The money being used was out of proportion to the business being done. Solutions: 1. Costs were re-examined and reduced in certain areas; prices were increased on certain units. 2. Collections were haphazard (about 25 per cent of the accounts were over 90 days past due). A collection manager was hired and delinquent accounts were reduced to 5 per cent with a few months. 3. Inventory was out of tune with turnover. An analysis turned up inefficient purchasing. Inventory was cut by one-third in five months.

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It's Easy — Just Follow These Directions Any One May Be Enough

1. POOR MARKET DIVERSIFICATION:
Make a too heavy commitment to one customer. If he decides not to renew or cancels his contract you might have an outside chance to find an early outlet for your goods.

2. LACK OF PRODUCT DIVERSIFICATION:
Don't worry about having alternatives ready in case of market trouble with any product. Stick strictly to your traditional line even if the danger of your market drying up keeps you in a vulnerable position.

3. NO RESEARCH AND DEVELOPMENT:
Don't try to stay even or ahead of your competition. Clutch onto old items even if the rest of the industry is bringing out improved products.

4. HANGING ON TOO LONG:
Don't give up the ship. Stay in the market even if it's beginning to turn sour.

5. OVERDIVERSIFICATION:
Get into as many lines as you can. Don't worry if your working capital and management are spread so thin you can't promote and manage any of them properly.

6. IMPROPER MARKET PLANNING:
Don't attempt to search for new markets for your product. Stick with what you have. If you decide to aim for new markets, don't research your choices beforehand.

7. TOO MANY PRODUCTS:
Have a big enough line so that you have to maintain a gargantuan inventory (even if volume on any one item might be too low to make mass production savings possible). Follow the philosophy: "Our competition has it, so we have to have it too."

8. MISUNDERSTANDING TAX REQUIREMENTS:
Submit bids on contracts without figuring in social security and unemployment taxes. Ignore the tax aspects of depreciation. Don't worry about tax claims resulting from improper understanding of your inventory evaluation.

9. UNREALISTIC EQIUPMENT REPLACEMENT POLICIES:
Don't put aside funds for replacement and upkeep of equipment. Ignore the possibility that obsolete equipment will raise your costs to where you can't produce goods cheaply enough to remain competitive.

10. IGNORING CUMULATIVE LOSSES:
Don't worry over a series of seemingly insignificant leaks. Best way is to not have the right kind of reports, or make them too cumbersome for easy reading, or delay their reaching the proper person.

11. INADEQUATE RECORDS:
Cut expenses in your accounting department even if you are accused of false economy. Don't worry about elaborate budgets and long and short term cash forecasts.

12. IMPROPER COST ANALYSIS:
Why worry about the cost of your plant and tools even if that results in classifying as expenses items which should have been capitalized. Don't worry about knowing exactly what your product costs you, either, even if that means high sales but little profit. Cumbersome, complicated records can help you ignore costs.

13. POOR PRICING POLICY:
Be exclusive and charge more than the traffic will bear. Better still, cut prices to where you're outselling competitors even if you aren't making a profit. Don't analyze costs thoroughly or demand a decent return on investment when setting prices. A policy based on misinformation about your costs can help.

14. HAPHAZARD CREDIT MANAGEMENT:
Ship to customers without any credit investigation. Don't follow up on delinquent accounts. Commit yourself heavily to a few accounts.

15. POOR INVENTORY MANAGEMENT:
Ignore the possibilities of low inventories resulting in poor service. Ditto for high ones getting you into a seriously imbalanced position in an item that can't be liquidated (Hoola Hoops and Davy Crockett hats might come back).

16. IGNORANCE OF BUSINESS:
Don't let a lack of knowledge about the peculiarities of a particular industry or product stop you from entering the field.

17. SPECULATIVE VENTURES:
If you feel you can break into a new product line, don't worry about analyzing the market before laying out the cash for the physical facilities you will need. The same holds true for defense equipment—get all set up and ready to produce before you try to get an order.

18. LEGAL DIFFICULTIES:
Be your own legal counselor even in such areas as patents, taxes, record keeping.

19. MISUNDERSTANDING PROFIT-VOLUME RELATIONSHIP:
Go ahead and add that $5000 in expenses even if you raise the break-even point of your firm by $20,000.

20. MANAGEMENT RIGIDITY:
As you move up the management ladder, continue to cling to your first love—be it engineering, production, sales. Don't worry about broadening your horizons.

21. NEGATIVE CUSTOMER RELATIONS:
Ignore complaints about late deliveries, poor quality control, lack of co-operation. Don't give technical assistance.

22. PURCHASING POLICIES:
Look at purchasing, not as a money saving tool, but merely as a requisition filler. Set no targets and no objective methods of measuring purchasing's performance. Don't let purchasing have a voice in management decisions.

23. POOR FINANCIAL PLANNING:
Ignore your fixed cost position. Don't worry about not having a firmly set policy detailing the percentage of return you expect from your investment. Don't bother to present your financial statement in a format geared to the particular information you need.

24. HAPHAZARD FORECASTING:
Play it by ear even if your sales and production forecasts are so far out of line your plant is either operating at too high or too low a level. Ignore communications problems between sales, marketing, production, purchasing.

25. POOR COMMUNICATIONS:
Go ahead and make that decision even if you have inadequate information. Don't be concerned about lack of accurate and timely data being channeled to the right man.

26. FAULTY MANAGEMENT:
If you're an owner-manager, base your decisions on ownership rather than management considerations. Don't be afraid of nepotism—it's all in the family. Milk the business of profits—you only live once and what's the sense of letting Uncle Sam get all this money.

27. FAILURE TO DEVELOP MANAGERS:
Don't worry about training a man as your successor when you get promoted, retire or die. Make it a rule not to delegate responsibility or give authority to subordinates. Don't analyze your managers periodically to see if they are growing with their jobs.

28. LACK OF WORKING CAPITAL:
Ignore the axiom that you can fail even though your assets are worth more than your debts. Forget that bills are paid with liquid funds, not frozen assets. Don't worry about running out of money needed to meet obligations when they become due.

SOURCES: American Management Association, National Industrial Conference Board, McKinsey & Co. Inc., Trundle Consultants Inc., Profit Counselors Inc., Small Business Administration, Dun & Bradstreet Inc.

Incentives for Inspectors

Warner & Swasey's plan chops inspection and supervisory costs. Based on averages, it provides some new information. Here's how this capital equipment builder did it

THE INSPECTION work force and its related supervisory and equipment costs have been cut 30 per cent by Warner & Swasey Co., Cleveland, reports Howard W. Geyer, director of quality control. Method: An incentive program for inspectors which is easy to maintain and supervise and inexpensive to install and operate. Another big benefit: The wage differential between various skills is maintained.

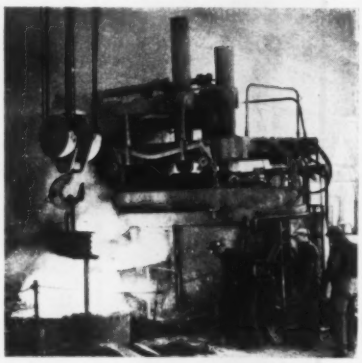
Other advantages: 1. An easier way to find the amount of faulty work getting by inspectors. 2. A better and more accurate method of assigning people. 3. Measures the individual inspector's workload (one can tell if he is productive or just busy). When quality drops to laxity, an additional inspector may be added to an area with consequent loss of bonus and a quick return to previous quality levels (or even above). The measure of workload may also help the manufacturing division determine the number of people to assign to machines on each shift.

• **Problem**—An extreme variation existed among inspection departments as to type of work inspected, the amount of inspection required, and quality requirements.

The company found a twofold solution: 1. Design a multifactor type of work measurement which would achieve a reasonably accurate workload measurement. (Factors: Number of machines from which work is inspected; number of pieces scrapped; number of pieces rejected; number of pieces within specifications; per cent of inspection required; weight of the piece produced; standard production hour value of the pieces accepted.) 2. Design a pay curve with a protective feature in case measurement was not exact enough for the extremes at the end of the deviation curve.

• **Preparation**—Warner & Swasey made four preliminary moves: 1. Held a group meeting with all involved to explain the facts. 2. Installed a line system where the inspector checks work at the machine rather than at a bench (when it may be too late). 3. Issued a General Tolerance Booklet defining tolerances. 4. Convinced operators that any work not like the drawing would be rejected. 5. Told engineers that all work would be done as drawn, so drawings must be accurate and complete. Results: Better parts, better drawings, and approval of the inspector group.

• **How It Works**—A variable delay allowance is standard practice at Warner & Swasey. A new pay curve with such a feature was created to conform to the greater variability in an inspector's job which is not found in production work. The firm says the pay curve is arbitrary and should be tailored to the individual company's needs. Warner & Swasey's plan allows the inspector to reach his rate of bonus opportunity quickly. It also has a protective feature against unearned bonuses which may occur due to inaccuracies in the system and those occasional days when nothing goes wrong. Based on averages, the plan can accommodate wide fluctuations in conditions because it is based on a number of factors. But a radical change in work would require new standards.



FLORIDA Steel Corp. plans to enlarge its electric steel mill, above, and add 36,000 sq ft of floor space to its fabricating facilities at Tampa. Florida Electric Steel Mill Div., started up in December, is producing at a rate of 45,000 tons a year

The number of machines covered by each inspector accounts for the walking time required. The time to measure a dimension was found to be a factor of weight in handling a part prior to measuring. Standard hours produced by the machine operators determines the total workload. Predetermined per cent of inspection set by the Quality Control Dept. decides the per cent of parts to be inspected.

A system of charge backs was developed to aid in maintaining and improving the quality level. After the operations, if defective pieces are found in subsequent departments, the inspection standard hour value is deducted from the bonus hours earned by the offending inspection group. Since the bonus payments are not on a 1 for 1 basis, the procedure has the effect of multiplying the penalty. Warner & Swasey is not satisified with this, but is the best it has found.

• **Paperwork**—The main piece is the line inspection card, an IBM card which was previously used to verify the operator's production count and act as his authority to ring off his present job to another, for production control purposes, and to identify reasons for scrap and rework. Now, it also provides a production count for inspection incentive.

The line inspector fills in the information required to calculate his incentive. The inspector signs his name and gives the card to the machine operator. The timekeeper completes the information needed, such as part and order numbers. The cards then go to the Payroll Dept. for tabulation.

• **Caution** — Warner & Swasey warns that inspector incentives aren't based on a direct measure of the inspector's effort. Action can't be taken merely on one day's work. Mr. Geyer recommends work sampling to see if the inspector's lot quality is as good as indicated and if work content has remained the same.

Machine Standards Are Set

The goal: Interchangeability of special machine components. But builders feel that adoption and use of the new standards will be a slow evolution, may never go all the way

THE LONG awaited building block standards for special machine tools are an accomplished fact—on paper. But it may be several years before they become standards in operation.

• **Three Goals**—The new standards have been set up to accomplish three objectives:

First, with an interchangeability of machine tool bases, feed units, adapters, and columns, the useful lives of the components can be extended. In theory, each user could accumulate an inventory of machines that, like erector sets, could be disassembled and regrouped into a variety of new combinations to accommodate new part designs.

Second, the extended useful lives could make automation practical on short or medium production runs where it has not been able to justify itself.

Third, increased flexibility of the production equipment could encourage more frequent design change in the users' products, providing more opportunity to incorporate technological advancements.

• **Slow Going**—Ford Motor Co. has supplied most of the drive for the new concept since the project was started in 1955. The standards will go into effect immediately at Ford. Other major auto builders will follow shortly, as will some companies outside the auto industry, like International Harvester Co., Caterpillar Tractor Co., and Allis-Chalmers Mfg. Co.

Then the adoption may slow down. Here are four reasons the concept won't be an overnight production reality:

• The new machines will be more expensive. Many builders already have their own standards. It will be costly to make pattern changes and production switches to build to the new designs, and that cost will show up in the machine price. One builder, who says he may submit dual bids, told STEEL the price on a building block design may be more than 25 per cent higher than the price of his conventional design to do the same job.

• Many division and plant managers will determine when the new standards will be put into use after adoption by their companies. It will be some time before the managers reach unanimity.

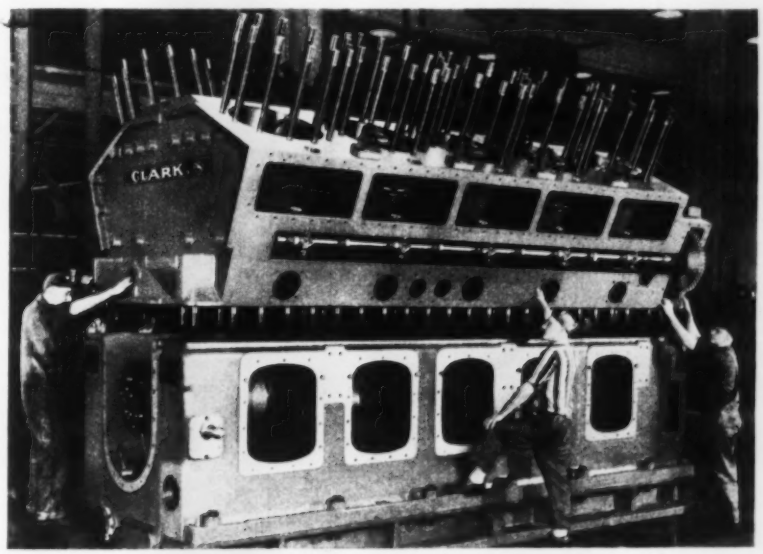
• The standards are written to cover single and multiple station machines, without regard for the job the machines will do. That means the concept applies equally to heavy duty machines for engine blocks and to machines that handle small parts, like distributor caps. It may remain more economical to buy lighter, less complex machines to handle light, relatively simple work.

• To wring the final chunk of economy out of the project, all competing builders should adopt the new standards as their own. That would help trim machine price, but it isn't likely. The cost of conversion could be great. (One builder just spent a reported $200,000 in redesigning and standardizing, and his new designs don't agree with the building block specs.) Some builders fear a restriction on their designers if standards are too tight.

Few builders like the idea of competitive interchangeability, in which a "Smith" column could be put on a "Jones" base. Also, builders point out they will have to continue to market to companies that don't use the new standards.

• **Plus and Minus**—For those users who adopt and adhere to the new standards, some real savings are possible. For them, it can alleviate the problem of rapid obsolescence of special machines.

For builders, the standards will offer a few headaches, but mostly it will be business as usual—specially designed and built machines for special jobs.



A V-TYPE, TURBOCHARGED, TWO-CYCLE GAS ENGINE is being introduced by Clark Bros. Co., one of the Dresser Industries. Several years in development, the V engine combines low fuel consumption with simplicity, reliability, and low maintenance costs. Here workmen are bringing upper and lower crankcases together for the compact 4000 bhp model (it has ten power cylinders). A 12 cylinder model is rated at 4800 bhp, a 16 cylinder model at 6400 bhp. They're designed for pipeline booster stations, for power generation, and pump drive

House Stretches Road Dollars

METALWORKING's market researchers must take another look at the interstate highway program, now that the House Ways & Means Committee has O.K.'d the sale of $1 billion in revenue bonds to finance the construction program.

The bond issue is in lieu of a 1.5 cent per gallon gasoline tax increase recommended by President Eisenhower in his January budget message. It means that apportionments of federal funds to the states for highway building will be less than half of what has been authorized for fiscal 1961 and 1962.

The 1961 apportionment, under the Ways & Means plan, will run $600 million, instead of $2.5 billion; 1962's will be $1.4 billion, instead of $2.2 billion. Apportionments for the remainder of the interstate program will be cut to allow the whole program to be stretched out to 1975, rather than 1969. The "ABC" program for primary state roads will be frozen at its present level of $925 million per year.

The Ways & Means action is not final: The House Public Works Committee must agree. Chances are, however, that Rep. Wilbur Mills's (D., Ark.) Ways & Means group has stated a principle that the whole U. S. Congress will follow.

The schedule of federal apportionments to the states will look like this, if the Ways & Means Committee has its way:

(Fiscal Years)

1961	$600 million	1968	2.1 billion
1962	1.4 billion	1969	2.2 billion
1963	1.5 billion	1970	2.2 billion
1964	1.6 billion	1971	2.3 billion
1965	1.8 billion	1972	2.4 billion
1966	1.9 billion	1973	2.4 billion
1967	2.0 billion	1974	2.4 billion

In 1975, apportionments will drop to $1.5 billion, the last year of the program.

This schedule takes into account a total cost of $36 billion for the entire program, including states' contributions. That estimate will probably be revised upward later, if prices rise. Market researchers who have based prospective sales on the old $25 billion schedule to be completed by 1969 must be aware that funds are slashed by as much as 40 per cent annually for fiscal years 1963 through 1967.

States Stop New Contracts

Don't forget, though, that this measure is an expedient one. A thorough revision of highway financing plans has been promised by 1962, after the Bureau of Public Roads completes a long range study comparing needs and benefits with methods of financing.

As the penny pinching in Congress has developed in the last three months, the proposal of the Ways & Means Committee is not too surprising, although most experts on highways have contended (and still do) that a slowdown in the program is unrealistic. Barring a veto of this financing method by the President (which would throw the program completely off the track), this stretchout compromise is not too bad for businesses concerned.

Compromise is still possible: Sen. Francis Case (R., S. Dak.), is beating the bushes for support on a measure calling for a 0.5 cent per gallon increase in the gas tax plus an advance from the U. S. Treasury, and a "slight" stretchout in the program.

Steel Usage Factors

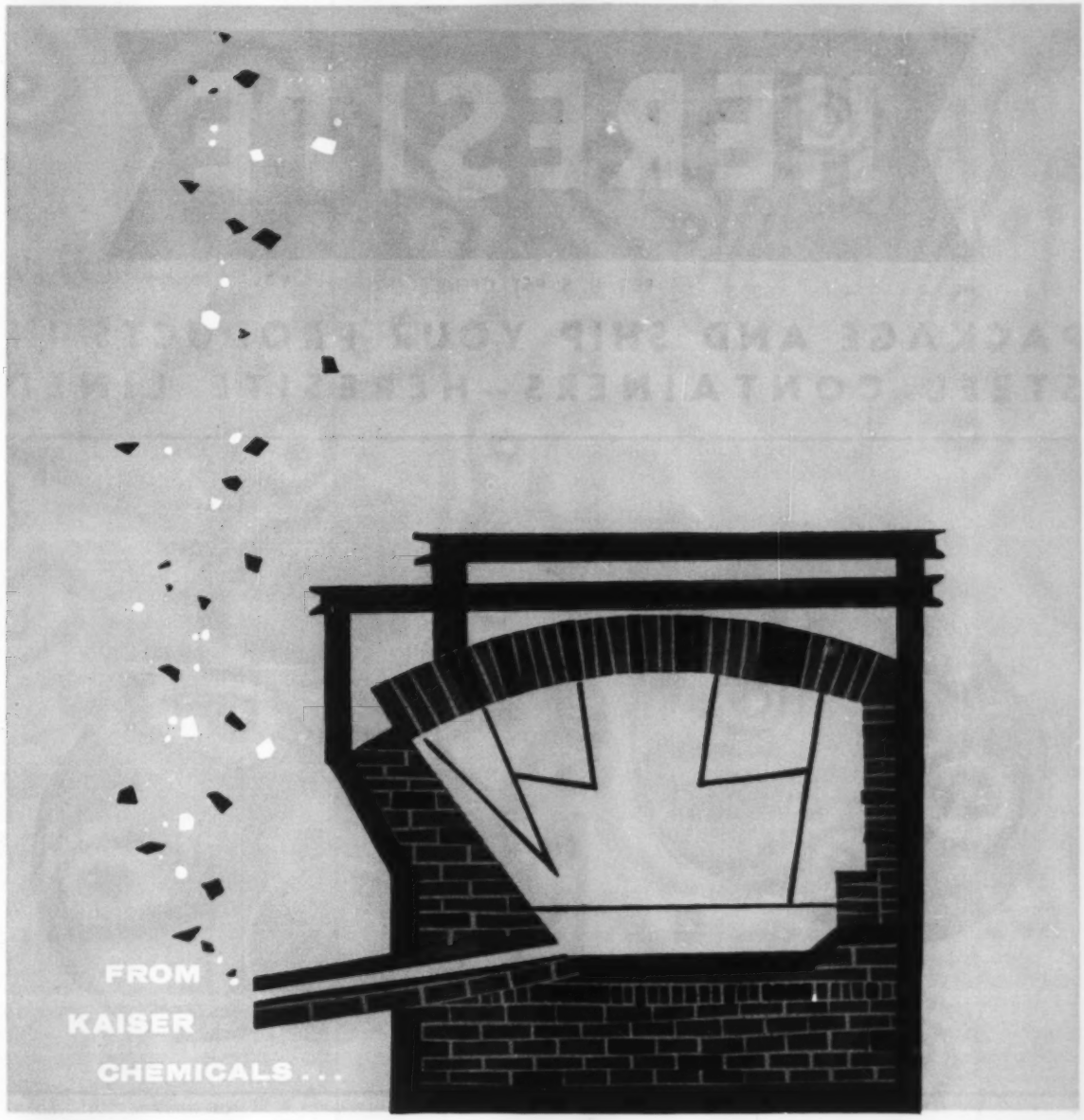
BPR publishes these figures on the use of steel per $1 million of highway contract construction: 199 tons of structurals, 197 tons of reinforcing steel, 35 tons of culvert pipe, and 47 tons miscellaneous steel products. BPR says the use of steel has dropped about 17 per cent since its 1955-57 study because of increased use of prestressed concrete.

Various states report what is happening to their highway programs as a result of Congressional procrastination: California will postpone $68 million worth of work in fiscal 1959-60; $154 million in 1961. Michigan might lose $300 million worth of work in fiscal 1960-61; Missouri, $150 million in fiscal 1961. Pennsylvania will stall plans to let $100 million in contracts this fall.

A New Yorker says the cutback could amount to the loss of 500,000 tons of black top production, 350,000 cubic yards of concrete, 10 million tons of sand and gravel, and 1.5 million barrels of cement. Work presently under construction would be held up for the apportionments of federal funds for fiscal 1963.

Power Authorities Buy Foreign Steel

Reports a spokesman for Rep. Don L. Short (R. N. Dak.): The New York Power Authority has ordered 7000 tons of steel for transmission towers from an Italian firm, which bid 40 per cent under the lowest U. S. firm's bid. The Bonneville Power Administration (Pacific Northwest) gave the same firm a contract for $3.3 million to fabricate 14,000 tons of steel transmission towers. The lowest U. S. firm bid $4 million.



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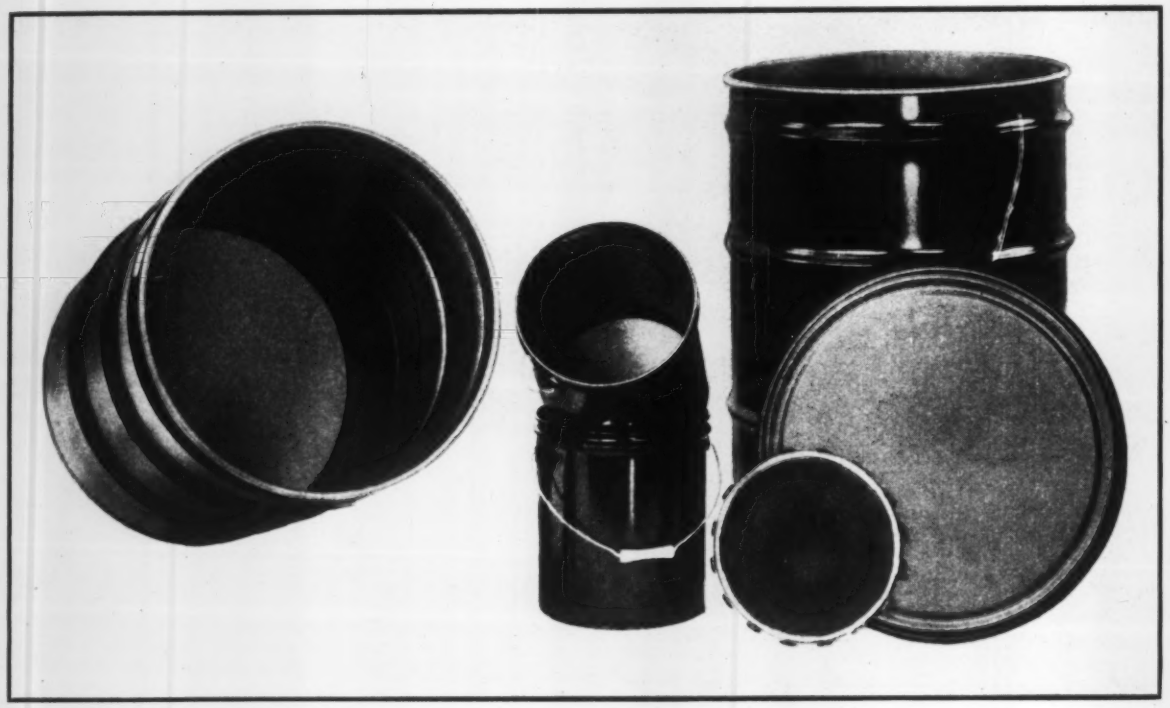

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Gas Utility and Pipeline Industries Step Up Use of Metals

	1958	1959*	1960*	1962*
	(Thousands of tons)			
Steel	2,008	1,983	2,589	2,100
Cast iron	42	45	54	83
	(Tons)			
Copper	1,264	1,471	2,084	3,222
Aluminum	42	48	54	79

Source: American Gas Association.
*Estimate.

Gas Firms Spend $1.9 Billion in '59

A RECORD $1859 million will be spent by the nation's gas utilities and pipe line companies for construction during 1959, estimates the American Gas Association, New York. That will be 4.9 per cent above the 1957 peak of $1772 million and will exceed the 1958 outlay of $1618 million by 14.9 per cent.

Reports indicate outlays for plant and facilities expansion will rise steadily, reaching $2166 million by 1962. AGA says 1959-62 construction is expected to reach $7.9 billion, a 25.7 per cent boost over the $6.3 billion spent in the previous four year period.

• **1958 Down**—Last year's capital spending dropped 8.7 per cent. Reasons: 1. Reduced industrial demand due to the recession. 2. Fewer new housing completions. 3. Regulatory uncertainties created by the since reversed Memphis Case decision (STEEL, Dec. 15, 1958, p. 85). 4. Confusion about federal regulation of independent gas producers. AGA adds that substantial evidence indicates the reduction was largely due to postponements rather than cancellations of construction projects.

• **Transmission Systems** — Extensions costing $715 million accounted for the largest share of last year's construction expenditures. They are expected to rise to $809 million this year and $1025 million in 1962. For the four year period ending in 1962, outlays will total $3.5 billion, up 27.5 per cent from the $2.8 billion spent in 1955-58.

• **Distribution Facilities**—Expenditures are expected to top $648 million this year, a 9.3 per cent jump from the $593 million peak of 1957. Spending in 1958: $541 million. Forecast for 1962: $730 million. Total spending through 1962 will be 28.9 per cent above the 1955-58 total of $2.2 billion.

• **Production and Storage** — Construction reached $291 million last year and will approximate $325 million in 1959. About $115 million of this will be spent for underground storage. Spending for such facilities is expected to soar to $468 million during the four years ending in 1962, an 86.5 per cent increase over the 1955-58 figure of $251 million.

• **Steel Use Up**—The industry used 2,003,000 tons of steel pipe last year. Pipe of 16 in. diameter and larger accounted for 66.4 per cent of the total (1,334,000 tons). While steel pipe use climbed 38 per cent over 1956, cast iron, copper, and aluminum use was somewhat below that in 1956.

Total utility plant of the gas industry advanced to a $18.07 billion high, 8.3 per cent above the $16.69 billion level of 1957. Total assets increased to $21.4 billion by the end of 1958. Assets in 1957: $19.76 billion.

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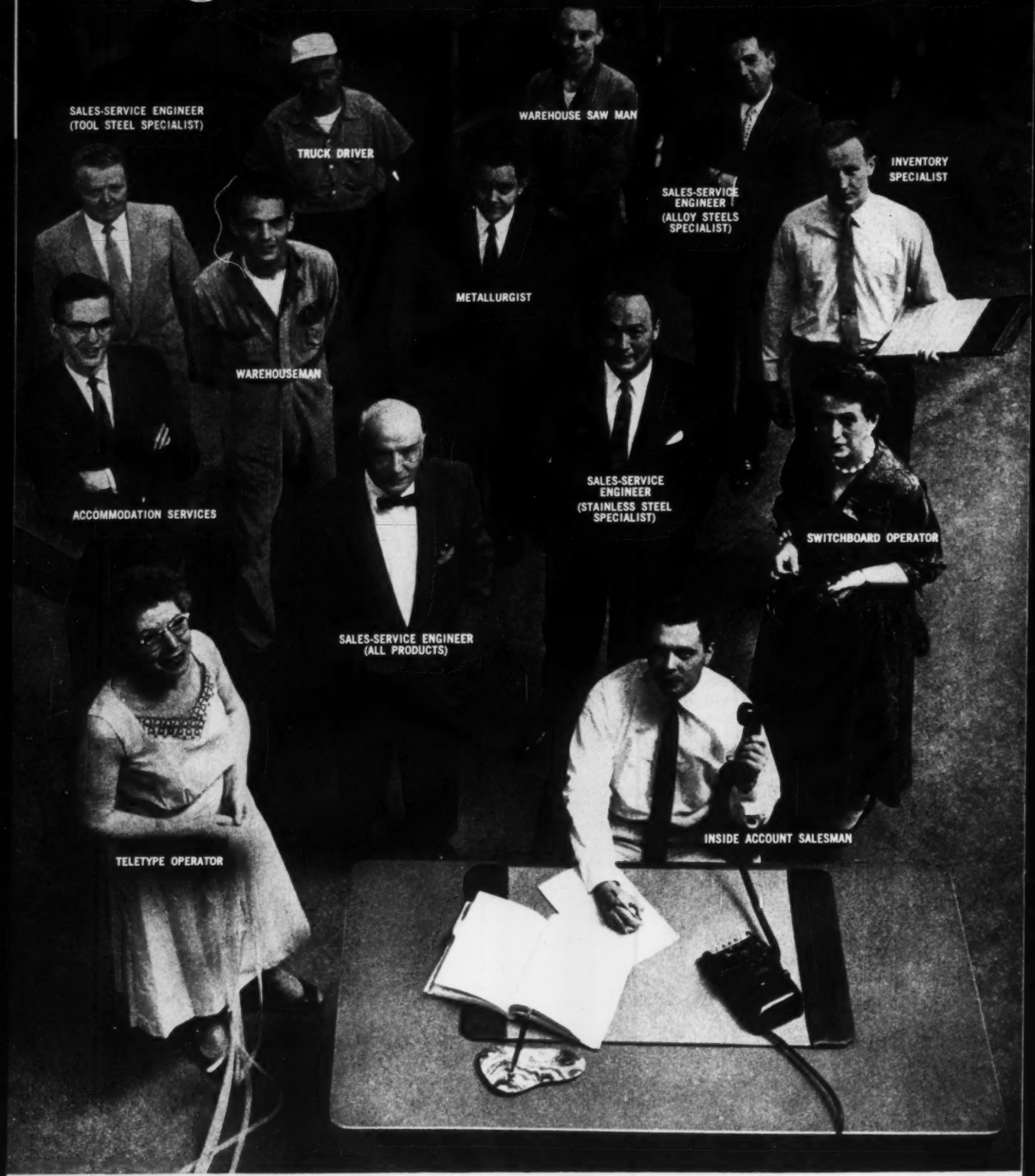

Local Crucible personnel provide service in depth, ranging from quick reports on steels available to expert assistance with metal working problems. Average warehouse staff is backed up by Crucible Metallurgists who, although located at mills, will travel.

maintains a variety of local facilities for handling customers' special requirements

"We *regularly* rely on the Crucible warehouse's equipment. Why, it would take us all day to cut steels they can cut in minutes. We've tried to do these cutting jobs ourselves and, frankly, we lose money nearly every time."

This purchasing agent's words are probably typical because countless companies, all over the country, rely on the **32** local Crucible warehouses for handling their special needs. Unusual cutting of specialty steel grades and sizes is just an example. Or, if a warehouse can't handle extras, such as forging, grinding, machining, boring, polishing, etc. itself, it arranges to have them done conveniently and economically outside.

It's entirely possible that your plant has these facilities. Even so, it can pay you to find out what the local Crucible warehouse has to offer. As one materials buyer put it:

"We have a 'get to know the suppliers' policy. I've visited the Crucible warehouse personally and made a list of its equipment. Here it is – under 'Suppliers' Facilities.' Two weeks ago, when all our saws were tied up, we had the Crucible warehouse cut the steels. They did it immediately, so my list paid off."

All Crucible warehouses maintain stocks, services and facilities to serve you. If you'd like to know more about them, phone or visit the warehouse nearest you – *any time*. Its facilities and services are part of Crucible's integrated operation, from ore to mill and warehouse delivery to you. *Crucible Steel Company of America, Dept. PH15, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

Customers' Master Files quickly give Inside Account Salesmen details on your receiving schedules and special requirements.

Inside Account Salesmen keep reference sources handy – give you fast breakdowns of analyses, or heat-treating, machining data.

Fleet of trucks and special delivery vehicles maintained at each warehouse ensure prompt, nearby deliveries.

Full stocks of specialty steels enable warehousemen to ready your order for shipment overnight – or earlier.

STOCK LIST

Keeps you up-to-date on local stocks of specialty steels. Just ask the Crucible salesman to place your name on the regular mailing list.

One Source For All These Steels

TOOL STEELS – Water, oil, air hardening, shock resisting, hot work, plastic and die casting steels in all forms, including bars, sheets, plates, drill rod, hollow bars, forgings and flat ground stocks

HIGH SPEED STEELS – Crucible's famous "Rex"® steels: Rex Thrift Finish rounds, hot rolled and cold drawn flats and squares, drill rod, forgings, sheets, plates, and tool bits

STAINLESS STEEL – Bars, sheet, strip, wire, cold heading wire, metalizing wire, plates, angles

FREE MACHINING STEELS – Crucible Max-el® rounds, hexagons, plates and brake die steel

ALLOY STEELS – bars, billets, strip and sheet

COLD ROLLED CARBON SPRING STEELS

DRILL STEELS – Hollow and solid drill steels

ALUMINUM EXTRUSION DIE STEELS

HOLLOW TOOL STEEL

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Machine Tool Orders:

The Trend Is Up

(Domestic orders for cutting types only, millions of dollars)

Source: 1959 forecast from STEEL's survey of buyers. Other years, NMTBA.

THE CAPITAL SPENDING **BOOM** BEGINS

Orders Will Bounce 24% in

METALWORKING companies in the U. S. will spend $474 million for metal cutting machine tools this year vs. $233 million last year—an increase of more than 100 per cent.

They'll order $263 million worth in the second half vs. $211 million worth in the first six months.

The uptrend will accelerate in 1960 when orders are expected to climb to $578 million.

• **What It Means**—This year, metalworking will invest $86 in machine tools for each production worker in the industry. Last year, investment per worker was $49—and employment was 700,000 lower than today.

For every metalworking plant in the U. S., $17,556 will be invested in machine tools this year. Last year, the figure was $8629. Next year, it should climb to $21,408.

That indicates industry's vigorous drive to lower unit manufacturing costs through investment in efficient equipment. Reliance Electric & Engineering Co.'s Control Div., for example, is saving $2252.68 a month (mostly in labor costs) through the purchase of one turret punch press.

But many metalworkers have yet to take advantage of this cost saving concept. Almost one-fourth of the nation's machine tools are at least 20 years old and more than 65 per cent are at least ten years old. Probably the biggest deterrent to replacement is the government's outmoded depreciation system. Reform (chances for it are improving) would permit industry to unleash its purse strings. The probable result: Machine tool orders would jump back up toward the levels of 1955 and 1956.

They're already headed that way. This year promises to bring builders $12 million more orders than they got in 1957. Next year, the order rate will climb more than half way back to the "good" 1956 level.

• **Who's Buying**—Electrical machinery and equipment producers, including appliance people, are leading the buying upturn. They'll spend 102 per cent more for machine tools in the second half of 1959 than they did in the first six months. Here's how other industries' machine tool buying will change in the second half vs. the first:

Automotive	68% more
General industrial machinery	23% more
Aircraft	22% more
Farm equipment	15% more
Steel	11% less
Metalworking machinery	12% less
Special industry machinery	28% less

After a period of "make do with what we've got," the auto industry is coming back into the market pretty lustily. The big gain in special machines (see table on Page 93) indicates hefty retooling for '61

How 2nd Half Orders Will Compare with 1st, by Types

Boring, drilling, tapping & threading machines	Up 19%
Broaching machines	Up 20%
Grinding, honing & lapping machines	Up 22%
Lathes, including automatic turning machines	Up 20%
Milling machines	Up 16%
Planers, shapers & slotters	Up 3%
Sawing, cutoff & filing machines	Up 12%
Special machines	Up 27%

Source: STEEL survey of machine tool builders.

Second Half vs. First

models. Most automotive orders for special machines are placed about a year in advance. And the auto industry is the backbone of the business. When it cut back such purchases sharply last year, an extreme buyers' market developed. The condition is still noticeable, although nearly half the builders of special machines expect their second half orders to be 25 per cent or more greater than those of the first half. Only one maker predicts a decline. About 1 in 3 looks for a gain of 50 per cent or more.

• **The Prices You'll Pay** — Price fighting still prevails. STEEL asked more than half the nation's builders to classify its severity. Of those responding, 35 per cent said "mild"; 27 per cent said "active"; 31 per cent said "serious"; 7 per cent said "critical." The price cuts are being made on all types of machines.

But you can look for considerable price firming before yearend. Four out of five builders say so; 3 out of 20 expect the fighting to get more severe; 1 out of 20 looks for it to remain about the same.

You can even expect some price increases. Four out of seven builders say they'll hike quotations during the second half. A few already have. The average boost is 6 per cent though increases will range from 2.5 to 10 per cent.

Observers believe one reason for the hikes is the forced acceptance of the auto industry's new building block concept. (It will permit replacement of one or more sections of a production line with other standard sections to adapt the line to production of new designs. Object: Longer useful lives for machine tools. See Page 85.) It's a costly innovation for the builders since most will have to redesign to meet the standards. Some companies outside the auto industry (Example: International Harvester) are expected to adopt the concept too. It will have a tendency to reduce replacement sales, but could open up new markets since it may permit the use of automation on more processes.

• **The Export Market** — The machine tool industry will get little help from export sales in its climb back to healthy output levels. Expect foreign orders for cutting types to total less than $26 million in the last six months of this year—about the same as the first half figure.

It means that foreign orders in 1959 will be only $2 million to $3 million higher than the depressed levels of last year. Total foreign orders in 1958 were only $48.5 million—the lowest in a decade. It means that builders are getting only half as much foreign business as they got in 1956 and less than one-third as much as in 1951.

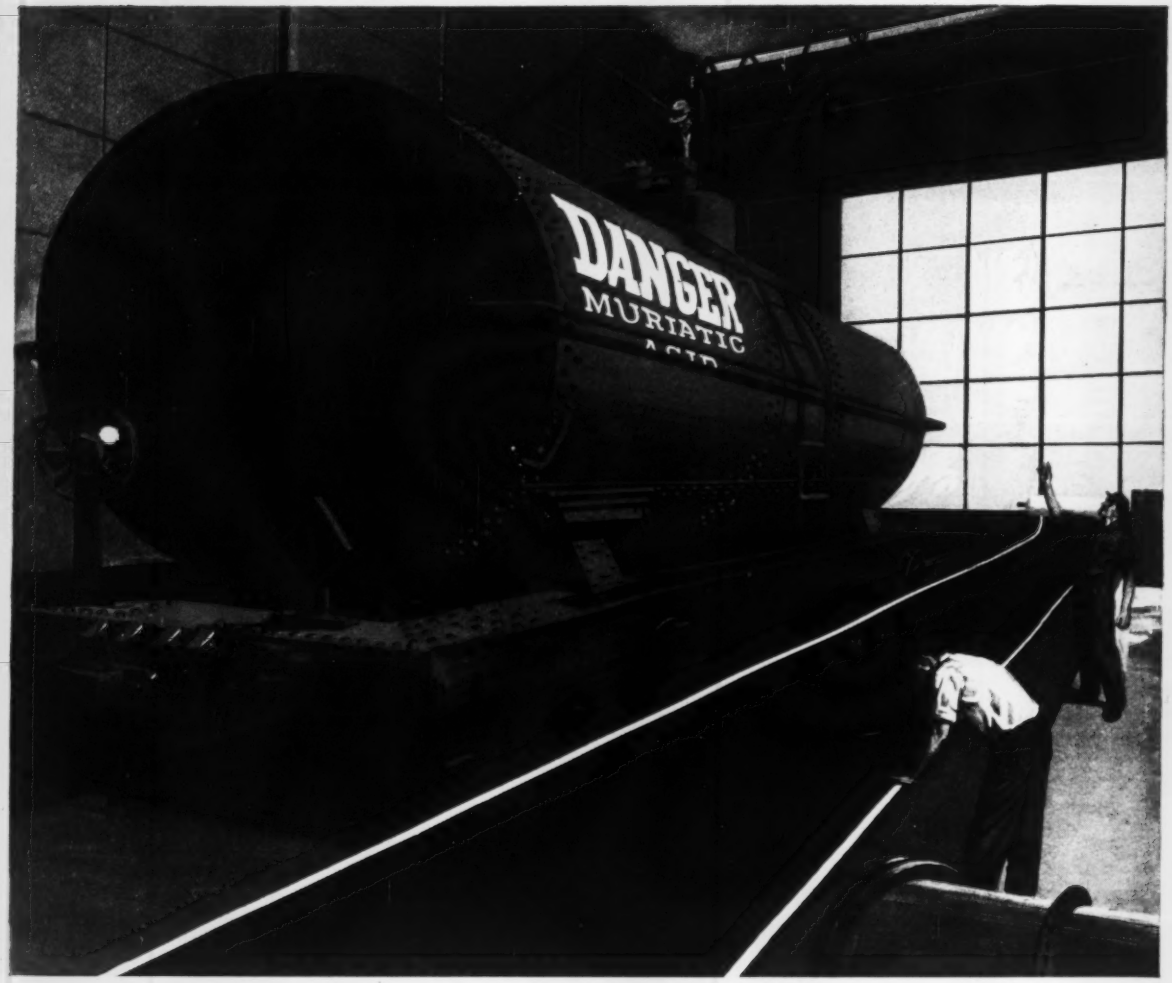
And, the domestic builders are losing sales in their home markets to foreign firms. Example: About half the radial drills sold in this country are built abroad.

The outcome of the situation: Builders are exporting capacity rather than machines. Nearly every major builder you talk to is manufacturing abroad, building a plant there, licensing a foreign outfit to build his machines, or trying to figure out some other way to get back into world markets. If the difference between U. S. and foreign wage rates continues as wide as today, you can expect to see machine tools designed in the U. S., built abroad, and shipped back to markets in this country.

• **Wrapup**—Look for machine tool sales to climb fairly rapidly during the next 18 months. But don't look for a 1955-56 type of boom in the near future. Chances are we'll be well into the "soaring sixties" before the machine tool industry again enjoys a billion dollar year.

This is the fifth article in STEEL's *new semiannual series on the outlook for capital equipment. Predictions are based on a* STEEL *survey of judiciously selected companies representing nearly one-third of metalworking's total spending for capital equipment. For this article,* STEEL *also surveyed the nation's machine tool builders. You can get an extra copy of this report by writing: Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

US RUBBER PERMOBOND LININGS



U.S. Permobond Linings protect tank car carrying muriatic acid

Permobond® is the rubber lining that is resistant to destructive chemicals. Here you see it about to be applied to a tank car by U. S. Rubber's local applicator in the New Orleans area—Avondale Marine Ways, Inc.

Any equipment, new or old, requiring protection against corrosive attack, needs Permobond Linings. They protect not only against muriatic acid, but against wet or dry chlorine, saturated chlorine, salt brine, sulphuric acid and other chemicals—and withstand temperatures up to 200°F. New equipment can be Permobond-protected before delivery. You can also have Permobond put on existing equipment. That's why so many corporations in basic chemical manufacturing, chemical processors and steel pickling plants have their equipment, large or small, lined with it. Get in touch with us for Permobond service in your locality.

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GMC Announces V-6 Family

THE LINE of V-6 gasoline powerplants developed by GMC Truck & Coach Div., Pontiac, Mich., has several basic advantages over V-8 and in-line, six cylinder mills: More torque at lower ranges, increased interchangeability of parts, simplified maintenance, and 50 per cent better fuel economy. The engines are expected to be in production early next year. They're slated for GMC's redesigned 1960 trucks; ultimately they will replace the division's V-8s.

Four models are in the line now, and more are supposed to come. Three are V-6s with displacements ranging from 305 to 401 cu in. The largest is a 702 cu in. V-12 (Twin Six). The smallest engine comes in three series. The 305-C differs from the A and B models in that it has a two barrel carburetor, larger fuel and water pumps, and a deeper oil pan. Since the engines are designed to operate most efficiently at less than full power, a five speed transmission and a single speed axle can be used on the larger models instead of the usual eight or ten speed gearbox.

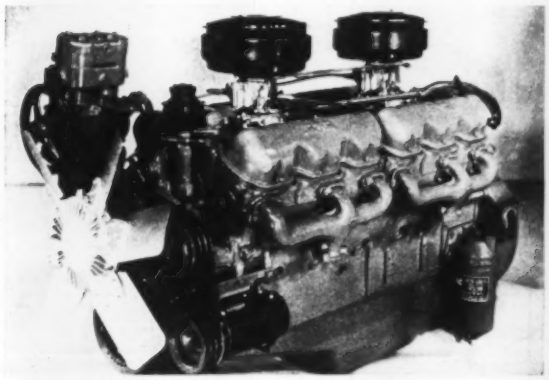
How GMC's V-6s Stack Up

* Displacement	Bore	Stroke	Comp. Ratio*	Torque*
305 A & B	4.25 in.	3.58 in.	7.7:1	260 @ 1600—2000 rpm
305-C	4.25	3.58	7.7:1	270 @ 1400—1600
351	4.56	3.58	7.5:1	312 @ 1800—2000
401	4.88	3.58	7.5:1	377 @ 1400—1600
702	4.56	3.58	7.5:1	630 @ 1600—1900

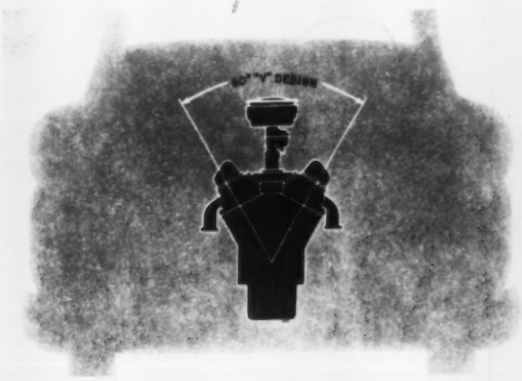
*Unofficial: Subject to minor changes.

• **They're Not Cheap** — Original cost will be about 50 per cent more than that of comparable diesel powerplants and slightly higher than GMC's present V-8s. Philip J. Monaghan, division general manager, contends that maintenance and operating costs will be lower to offset the initial price. He says tests indicate the V-6s have three to four times the life potential of other gasoline truck engines. "With proper operation and maintenance, they can run up to 200,000 miles without major overhaul," claims Mr. Monaghan.

He also points out that GMC will be able to cut its inventory of replacement parts 40 per cent. He believes fleet operators can do the same. Over 70 parts are interchangeable with the six cylinder jobs, and 50 parts are common to



Low contour of GMC's Twin Six makes under cab mounting easier. Two carburetors, synchronized so throttle openings match, are mounted on separate manifolds



This silhouette view shows how the narrow 60° V engine will fit between truck frame rails without interfering with wheels or steering mechanisms

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the V-6 and V-12 models.

• **Do Better Job**—Unlike many V-8 truck engines which started out as passenger car mills, the V-6 family has been designed from the ground up for heavy duty use, asserts C. V. Crockett, GMC's chief engineer. The 60°V and generally more compact engine sizes can be low mounted between the front wheels and under the cab, permitting a reduction in over-all length. They should work well in a new tilt cab truck GMC will be introducing shortly.

Valve trains, water flow, and sparkplug location are other interesting design features. GMC believes tappet wear stems from initial scoring—when the engine is started and before enough oil has circulated. To get around the problem, engineers have designed an oil trough which goes under the camshaft. It holds oil for splash lubrication when the engine is started. Mr. Crockett thinks the system will practically eliminate cam, valve, and tappet wear. He says tests indicate valve life in the V-6s is four times as long as it is in conventional in-line and V-8 engines. Cams and camshafts are Parkerized for long wear and smoother operation.

Another reason for extended valve life: Valves are spread farther apart, so there's plenty of water cooling space between them. Mr. Crockett says there are no adjacent exhaust valves in the train. The design is possible because engine length is limited by the crankshaft instead of by the number of valves. Mechanical valve lifters are used on all but the Twin Six. That model has hydraulic lifters.

• **Run Cooler**—Extra heavy water flow also prolongs part life. Water is pumped directly to the front of the cylinder block, through the entire block around the bores, then through the transfer holes at the back of the block to the cylinder head. After passing completely through the heads, the coolant returns to the pump and radiator. Depending on the engine size, the water circulates at the high rate of 120 to 200 gallons per minute through the head and about half that rate through the radiator. A bypass cuts water flow in half when the thermostat is closed.

For maximum efficiency and faster warmup, the intake manifold is preheated by exhaust gases pulsating from one head to the other through a passage cast in the bottom of the intake manifold. Sparkplugs are on the intake side of the heads for cooler operation and easier access. Valve tappets can be pulled without removing the head.

• **Structurally Stronger** — Cylinder blocks and heads are cast from a fine grain, nickel-chromium alloy iron. Each model uses a separate block, but two heads do for the whole line. The crankshaft in the 305 series is cast from pearlitic malleable iron. Larger engines have forged, chrome alloy steel crankshafts. They're heavier for rigidity and strength. The 401 crankshaft weighs 110 lb compared with 63 lb for a comparable V-8.

The 60°V design also aids crankshaft rigidity because the crank pins overlap due to the peculiar firing order of the engine. Despite their massiveness, the engines weigh about the same as similar V-8s, although they're heavier than in-line, six cylinder jobs. The 401, for example, weighs 839 lb under load. The engines have about 0.002 in. of unbalanced motion which is absorbed by rubber mounts so they're almost perfectly counterbalanced.

U. S. Auto Output

Passenger Only

	1959	1958
January	545,757	489,515
February	478,484	392,132
March	576,085	357,048
April	578,825	316,594
May	546,817	349,613
June	558,026	337,446
July	551,200†	321,017
7 Mo. Totals	3,835,194	2,563,365
August		180,447
September		130,460
October		261,701
November		514,152
December		593,920
Total		4,244,045

Week Ended	1959	1958
July 4	108,397	35,273
July 11	123,147	73,062
July 18	127,502	85,533
July 25	124,446	85,519
Aug. 1	120,916†	62,846
Aug. 8	116,000*	65,614

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Although Mr. Crockett emphasizes the V-6s are aimed for truck use, we'll bet some people will try them out in passenger cars.

Exhaust Notes

• Talk from Dearborn is that Ford Div. is programing 449,000 engines for the Falcon's 1960 model run. The company's planning schedules reportedly call for 1.9 million engines for all of Ford's 1960 vehicles, including trucks.

• As Ford ended a four day meeting with suppliers, Earl Ward, purchasing vice president, told venders: "We expect you to ship parts to schedule. We expect your prices to be fully competitive." Mr. Ward adds that quality will not be sacrificed: "To allow bad parts to be shipped is something we cannot understand and which we expect to treat as an unpardonable sin." The company is embarking on a stringent quality drive.

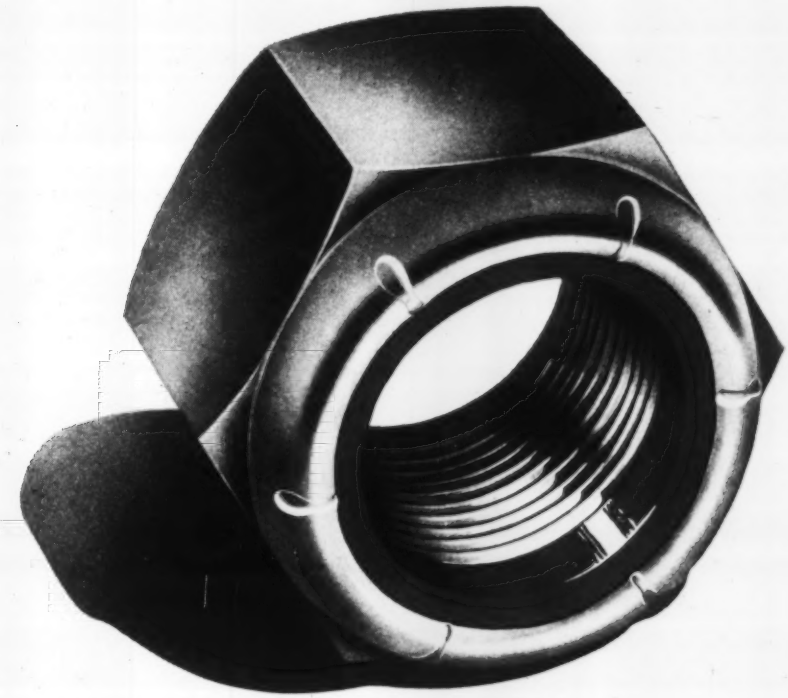
• Willys Motors Inc., Toledo, Ohio, reports domestic sales of Jeep vehicles are 44 per cent ahead the pace of last year's first half. Dealer sales are up 67 per cent. Parts and special equipment sales have climbed 18 per cent above last year's levels. Willys has just received nine government contracts (worth $538,123) for Jeeps and spare parts.

• At mid-July, Rambler sales stood 129.7 per cent over the year-to-date level in 1958. American Motors Corp. dealers have delivered 283,568 compact cars compared with the 123,466 units through the same period last year.

• The auto industry increased base hourly wage rates 6 cents (2.5 per cent) on Aug. 1. (They were granted under the annual improvement factor clause of contracts with the UAW.) The benefactors: 120,000 Ford workers and 330,000 GM hourly employees.

• First half automotive replacement sales have established record highs, says Joseph Anderson, general manager, AC Spark Plug Div., General Motors Corp. Total replacement sales are 10.3 per cent above 1958's first half. Sparkplug sales are 23.5 per cent higher than in June of last year and 6.2 per cent over the previous record June of 1957. Fuel pumps and oil filters show gains of 46 and 23 per cent over previous record months.

How many times can this nut be re-used?



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Re-usability is just one of the advantages of the nylon insert Elastic Stop nut. The constant torque that locks the nut at any position on the bolt: the inertness to gasolines, oils, salt atmospheres, cleaning compounds and common acids: the easy identification on the assembly line or in the field: the one piece construction that simplifies installation and reduces cost—these special features have made the Elastic Stop nut the standard of industry for tough applications.

Elastic Stop nuts are available in thin and regular height hex types in sizes ranging from a watchmaker's 0-80 through 3 inches, also many special shapes to meet your unusual design problems. In standard finishes and materials including carbon and stainless steels, brass, duronze and aluminum.

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Our customers can now look forward to a growing supply of carbon and alloy steel plate, plate shapes, heads, weldments . . . Lukens "T-1," "Nine Nickel" and clad steels. In addition to greater capacity, the new facilities will provide even better steel plate quality.

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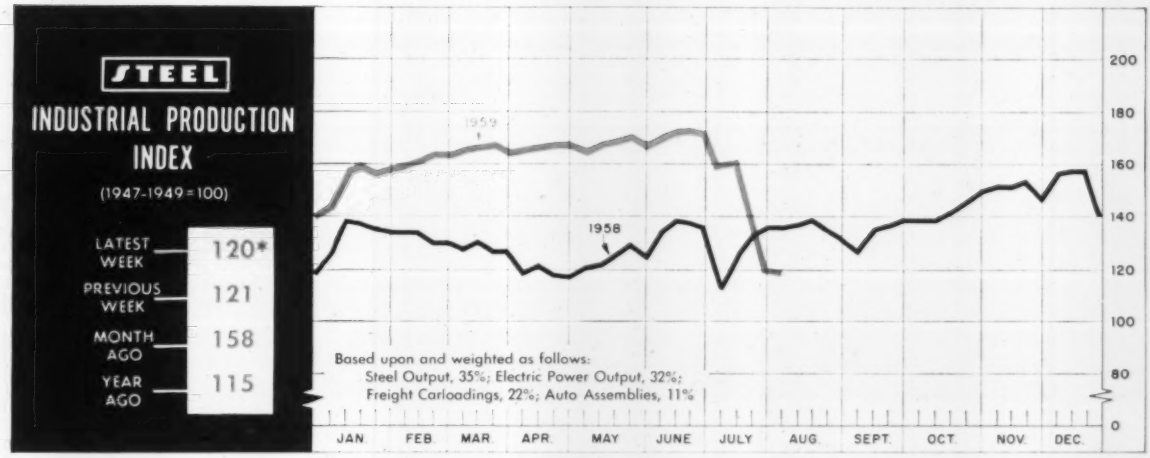

*Week ended Aug. 1.

Strike Fails to Slow Down Economy

WITH nearly four weeks of the steel strike behind us, the question might well be, "Who is hurting?" The answer seems to be, "Nobody —yet."

A STEEL survey of businessmen in six major steelmaking areas reveals this general pattern: Most people, including the steelworkers, were set for the strike. You have to go down to the neighborhood level before you see the obvious personal effects of the walkout. On the city or area level, the strike has caused barely a ripple in the stream of business activity. And nationally, you'd never know we were having a major industrial stoppage from the way the economy is holding up.

• **Critical Period Ahead**—It is still too early to detect many signs of hardship. Most users of steel have enough to go another two—maybe three—weeks before they have to consider cutting back (see Page 77). Workers affected by the strike didn't draw their last pay checks until late in July, and many have considerable savings to work off before they are tightly pinched. Merchants may forestall even that eventuality through extension of credit. It will be Labor Day before the squeeze is really felt.

• **Exceptions**—That doesn't mean that everybody is getting off scot-free during this strike. In almost every major steelmaking area, there is at least one hard hit section.

In the Gary, Ind., section of the Chicago district, some durable goods purchases are being postponed. But Chicago informants say that even there, auto sales are holding up pretty well.

In the Lorain, Ohio, section of the Cleveland district, U. S. Steel's National Tube Div. is the primary employer. Credit indebtedness is climbing rapidly there and in other such centers, although few workers are slowing down on their buying.

• **Slowdown Cycle**—A spokesman at

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1,000 net tons)[2]	340[1]	345	1,586
Electric Power Distributed (million kw-hr)	13,650[1]	13,577	12,619
Bituminous Coal Output (1,000 tons)	7,250[1]	7,120	7,896
Crude Oil Production (daily avg—1,000 bbl)	6,825[1]	6,855	6,545
Construction Volume (*ENR*—millions)	$331.5	$651.7	$388.0
Auto, Truck Output, U. S., Canada (*Ward's*)	144,888[1]	157,016	80,374
TRADE			
Freight Carloadings (1,000 Cars)	525[1]	536	622
Business Failures (Dun & Bradstreet)	245	242	264
Currency in Circulation (millions)[3]	$31,890	$32,043	$31,086
Dept. Store Sales (changes from year ago)[3]	+5%	+7%	+3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$24,381	$26,504	$21,667
Federal Gross Debt (billions)	$289.3	$289.3	$275.9
Bond Volume, NYSE (millions)	$28.6	$26.0	$27.3
Stocks Sales, NYSE (thousands of shares)	15,069	14,785	18,760
Loans and Investments (billions)[4]	$105.9	$106.6	$93.8
U. S. Govt. Obligations Held (billions)[4]	$30.7	$31.5	$32.1
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	239.15
STEEL's Nonferrous Metal Price Index[6]	217.5	217.6	119.4
All Commodities[7]	119.2	119.3	119.4
Commodities Other than Farm & Foods[7]	128.2	128.1	126.0

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1959, 2,831,486; 1958, 2,699,173. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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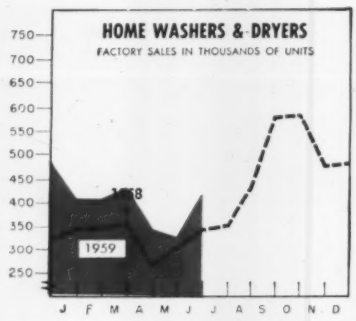
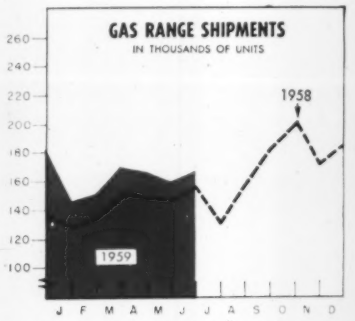
THE BUSINESS TREND





	Washers 1959	Washers 1958	Dryers 1959	Dryers 1958
Jan.	288,491	244,840	118,220	100,793
Feb.	297,826	268,143	106,274	79,683
Mar.	329,668	287,884	98,434	71,523
Apr.	274,372	224,896	67 752	38,475
May	277,934	262,999	45,903	41,898
June	341,894	288,831	70,838	54,173
July	.....	277,287	.....	75,513
Aug.	.....	326,785	.....	109,833
Sept.	.....	423,073	.....	158,733
Oct.	.....	404,056	.....	180 405
Nov.	.....	333,035	.....	142,499
Dec.	.....	330,520	.....	148,670
Totals	.....	3,672,349	.....	1,202,198

American Home Laundry Mfrs. Assn.

Charts copyright, 1959, STEEL.

	Shipments—Units 1959	1958	1957
Jan.	148,800	128,200	149,600
Feb.	152,400	134 200	161,600
Mar.	171,500	149,300	179,400
Apr.	164,900	148,300	168,800
May	161,300	147,300	156,200
June	167,300*	155,800	156,300
July	.....	129,300	137,400
Aug.	.....	157,600	182,600
Sept.	.....	182 100	192,100
Oct.	.....	211,900	195,500
Nov.	.....	171,100	154,300
Dec.	.....	181,000	135,800
Totals	.....	1,896,100	1,968,600

*Preliminary.
Gas Appliance Mfrs. Assn.

the University of Pittsburgh's Bureau of Business Research observes that so far this strike is going about the same way every other strike has gone. First steel operations drop close to zero. Then coal production dips. Next, it's a decline in rail and truck shipments, followed by barge shipments. A gradual decline in power output then comes as secondary industries slow down because of lack of steel or unbalanced inventories. Finally, trade drops off, but it takes anywhere from six to eight weeks of work stoppage for that to show up.

Right now, he says, we are at the barge traffic stage. Steel stocks are still good, so other industrial activity is keeping electric power output up. And retail sales in Pittsburgh are actually increasing rather than showing any ill effects from the strike. "Eventually, they'll slow down," he observes. "But by the end of the year, the totals will be back to about the same level they would have been if there hadn't been a strike."

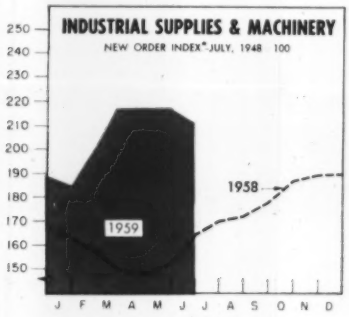
• **Diversification Helps**—In areas where there is a great variety of business activity, much of the slack from the strike is being taken up by other industries. In places like Cleveland and Chicago, while steelmaking is important, it is still a small portion of the over-all picture. From Birmingham comes word that even though the steel industry is the biggest single employer, the strike will have little influence on the total business picture unless it goes beyond Labor Day. "Then it won't be us alone," STEEL's informant declares. "It'll be the whole nation."

From other industrial centers, like Detroit and Philadelphia, the word is the same: No mass concern yet; no psychological impact. It'll be another ten days or two weeks before you see any major problems.

Association Heads Agree

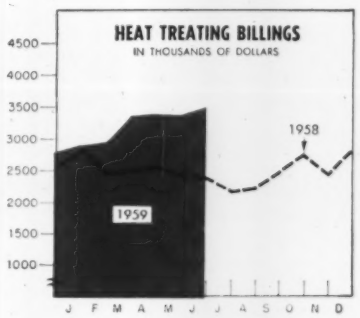
Reports from industry associations tend to confirm the pattern. In an informal poll of some of its members, the American Society of Association Executives found little pessimism outside of transportation.

John Lawrence, manager of the American Trucking Associations, says that trucking firms were hit almost immediately, especially those hauling directly from mills to warehouses and fabricators. About 15,000 drivers are involved in hauling steel. (However, the ATA weekly report



	1959	1958	1957	1956
Jan.	186	163	221	190
Feb.	202	157	219	190
Mar.	218	149	210	190
Apr.	218	148	203	195
May	218	152	199	199
June	212	164	199	197
July	...	170	197	203
Aug.	...	172	197	211
Sept.	...	178	203	203
Oct.	...	187	192	206
Nov.	...	189	180	220
Dec.	...	190	167	218

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.



	1959	1958	1957
Jan.	2,915.5	2,825.5	3,533.9
Feb.	2,976.0	2,466.3	3,378.9
Mar.	3,397.3	2,490.5	3,631.8
Apr.	3,420.6	2,538.0	3,572.4
May	3,405.6	2,421.5	3,389.6
June	3,518.5	2,367.3	2,912.1
July	.....	2,139.6	2,767.5
Aug.	.....	2,213.0	2,830.8
Sept.	.....	2,457.1	2,765.0
Oct.	.....	2,744.9	3,076.2
Nov.	.....	2,422.0	2,677.2
Dec.	.....	2,799.4	2,579.3

Metal Treating Institute.

of intercity truck tonnage shows that for the first complete week of the strike, ended July 25, tonnage was down from the previous week by only 0.5 per cent.)

The Association of American Railroads believes the 1959 strike will follow the 1956 pattern, in which average weekly loss in freight carloadings was 148,000 cars. The breakdown: 70,000 cars of iron ore; 20,000 of coal; 8000 of coke; and 50,000 of miscellaneous commodities.

The National Retail Merchants Association feels that if the strike is long, the impact on retailing will be serious, especially in steel towns. But the National Retail Credit Association reports that local business still is good and its members are continuing to extend credit.

While a shortage of custom shapes is already hurting some road construction, stocks of standard items are sufficient to prolong good activity for a "reasonable time," says the American Road Builders Association. In other types of construction, the Contracting Plasterers & Lathers International Association reports ample stocks of light shapes. Construction will be limited only by supplies of heavier steel shapes, the association says. (H. C. Turner Jr., president of New York's Turner Construction Co., says there is no serious threat to heavy construction in the immediate future.)

Lowell Ryan, executive vice president of the Malleable Founders' Society, states that his industry is operating at high levels now, but anticipates some cutbacks from automotive, railroad, farm implement, and other industries as they retrench after six or eight weeks of strike.

The most serious situation in hard goods seems to be in the farm implement field. Harold Halter, managing director of the Farm Equipment Manufacturers Association, says the supply situation will be serious within 30 days from the strike's beginning. Increased sales (up as much as 30 per cent) in the first half prevented many small independent producers from stocking as much steel as they wanted.

Guenther Baumgart, president of American Home Laundry Manufacturers Association, believes his industry can weather a strike up to eight weeks long. However, with sales running significantly above year-ago levels (see graphs, Page 100), his members are somewhat concerned about the danger of losing production in the midst of high consumer demand in the event of a long strike.

In a recent nation wide survey of honeycomb section manufacturers by an independent research organization, 75% of the responders indicated that uniform thickness of the thin metal core material was the most important factor demanded of suppliers.

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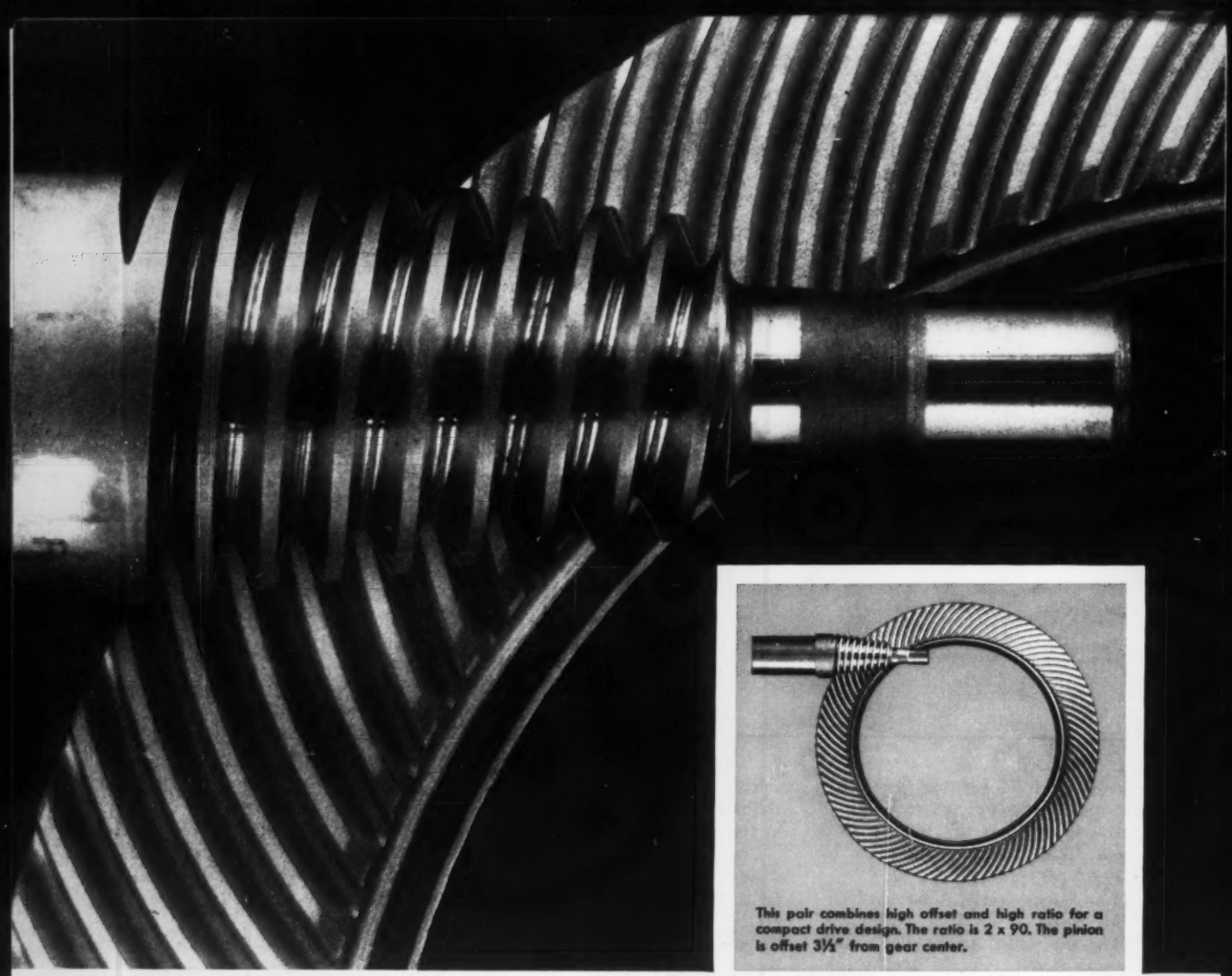

This pair combines high offset and high ratio for a compact drive design. The ratio is 2 x 90. The pinion is offset 3½" from gear center.

See how the teeth "wrap around" this high-reduction pinion

This is a high-ratio hypoid gear. In principle, it is not different from more conventional hypoids produced by the Gleason Works. *But . . .*

If you look closely at the pinion, you'll notice that the teeth tend to "wrap around" it. This design is extremely well suited for high reduction, strength and compact design.

The result is a conical (or sometimes cylindrical) pinion which permits *continuous tooth action—even with just one or two teeth!* Compared to corresponding bevel pinions, its diameter is greater for higher strength. An extended shank on cylindrical pinions makes *very rigid* straddle mountings practical.

You can design a *compact* unit, because high offset is possible! For high-offset *or* high-ratio pairs, the "wrap around" tooth design provides an extra measure of the smooth, quiet tooth action of hypoid gears.

High-ratio hypoids can be cut on the same Gleason equipment that is used on more familiar spiral bevel gears and hypoids. You can also use the same testers, quenching presses and other auxiliary Gleason equipment you're using now. Grinders are available for applications requiring precision finish.

High-ratio hypoids can be produced by the Gleason Works for ratios of 1:10 or 1:10 or even higher. They are finding a growing number of applications in such diverse fields as farm machinery, instrumentation and office equipment.

You can get more information about Gleason high-ratio hypoid gears by writing for free literature. Submit your prints for recommendations.

GLEASON WORKS

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ROBERT J. JACOBS
Midland-Ross executive

FREDERICK A. FIELDER
Loewy-Hydropress Div. v. p.

HENRY H. HEMENWAY
Graver research dir.

EDWIN P. BOYER
Roebling's Sons v. p.

Midland-Ross Corp. named **Robert J. Jacobs** general manager of its subsidiary, the John Waldron Corp., New Brunswick, N. J., and of its Hartig Extruder Div., Mountainside, N. J. He was general manager of the Black-Clawson Co.'s Dilts Div.

Frederick A. Fielder was elected vice president and general manager of the **Loewy-Hydropress Div.**, New York, Baldwin-Lima-Hamilton Corp. Former general sales manager and assistant general manager, he succeeds the late **Erwin Loewy.**

J. Thomas Swift was appointed manager of sales and **John Knarr** assistant manager of sales, **Baker Industrial Trucks Div.**, Cleveland, Otis Elevator Co. Mr. Swift was assistant manager of sales.

James H. W. Conklin will join **Pratt & Whitney Co. Inc.**, West Hartford, Conn., as general sales manager Aug. 17. He was a management consultant in sales and marketing.

Jones & Laughlin Steel Corp., Pittsburgh, appointed **Smith M. Wilson III** assistant manager-sheet mill products; **Richmond Nicholas Jr.**, assistant Pittsburgh district sales manager; and **Donald L. Rehberg**, assistant controller.

Risdon Mfg. Co., Naugatuck, Conn., named **Lawrence F. Heileman** managing director of its Cosmetic and Aerosol Divisions; **Edward Noyack** managing director of the Naugatuck and Waterbury plants; and **Andrew C. E. Peasco** industrial sales manager.

Henry H. Hemenway was appointed director of research and engineering, **Graver Tank & Mfg. Co.**, East Chicago, Ind., a division of Union Tank Car Co. He was with Foster Wheeler Corp.

Robert E. Huson was made sales manager, eastern district; **Lloyd G. Miller**, sales manager, midwest district, **Nichols Wire & Aluminum Co.**, Davenport, Iowa.

Caleb A. Shera was appointed sales manager of the new **Acco Power Products Div.**, American Chain & Cable Co., Exeter, Pa. He was with Steltenkamp-Wilson & Associates.

W. B. Jameson was appointed manager of works of the Torrance, Calif., fabricating works, Pacific Coast Div., **Bethlehem Steel Corp.** He succeeds **Fred C. Todd Jr.**, retired.

William F. Newbold was made director of research, **Brown Instruments Div.**, Philadelphia, Minneapolis-Honeywell Regulator Co. Former assistant research director, he succeeds **Walter P. Wills** who was named to the new post of technical adviser to the director of engineering.

William H. Baudouine was named general manager, Abrasives Div., **Elgin National Watch Co.**, Elgin, Ill. He was sales manager.

Donald L. Reed was named manager-packaged compressor sales, **Cooper-Bessemer Corp.**, Mt. Vernon, Ohio. He remains product manager for gas engine compressor sales.

Edwin P. Boyer was elected vice president of production, **John A. Roebling's Sons Corp.**, Trenton, N. J., subsidiary of Colorado Fuel & Iron Corp. He was manufacturing manager of the Cold Rolled Steel Products Div.

Edgewater Steel Co., Pittsburgh, named **R. M. Heyl** general manager; **P. J. Nicholas** director of manufacturing control; **Leo D. Dunlap** superintendent of manufacturing; **T. C. Tiernan** assistant superintendent of manufacturing; **R. T. McElhose** manager of quality control; and **C. C. Gerding** assistant chief engineer.

Dalton Foundries Inc., Warsaw, Ind., elected **Donald A. Dalton** vice president in charge of foundry operations and **J. Joseph Shellabarger** vice president in charge of industrial sales.

Richard A. Wilson was named vice president of **General Mills Inc.**, Minneapolis, and general manager of the company's Mechanical Div. He was vice president, Daystrom Inc.

J. E. Dato was made sales manager, electric welding, by **Linde Co.**, New York, a division of Union Carbide Corp.

Mingo Oxygen Co., which will build an oxygen generating plant at Mingo Junction, Ohio, elected the following officers: **Edwin H. Johnson Jr.** president; **Russell J. MacMullan** vice president; **L. Woodward Franzheim** vice president and treasurer; **J. Gordon Hutchinson** vice presi-

J. J. ROZNER
Aetna Ball president

MILTON C. YOUNG
Williams & Co. asst. v. p.

FREDERICK A. TWOMEY
Royal Industries v. p.

HEINZ HANAU
Industrial Tectonics post

dent and comptroller, and **Harry R. Hesse**, secretary.

J. J. Rozner was elected president, **Aetna Ball & Roller Bearing Co.**, Chicago. He is also vice president and director of the parent company, Parkersburg-Aetna Corp.

Milton C. Young was appointed assistant vice president in charge of operations of **Williams & Co.**, Pittsburgh. He was manager of the Aluminum Dept. Other appointments include: **Edward A. Miller**, assistant to the vice president in charge of sales; **Milton C. Rixman**, manager of the Aluminum Dept.; and **Charles M. Brady**, manager of the Accessories Dept.

John F. Linsley was appointed manager of industrial sales, **Airborne Instruments Laboratory**, Mineola, N. Y., division of Cutler-Hammer Inc. He was manager of industrial control systems sales.

Phillip N. Ross was appointed general manager of the **Bettis Atomic Power Laboratory** which Westinghouse Electric Corp. operates for the U. S. Atomic Energy Commission. He was reactor engineering manager.

A. Forest Wells Jr. was named superintendent of tin finishing and galvanizing, **Midwest Steel Corp.**, a division of National Steel Corp., Pittsburgh.

Robert N. Mitchell was promoted from quality control manager to general superintendent, **Marchant Calculators Div.**, Oakland, Calif., Smith - Corona Marchant Inc. **Thomas E. Heumann** was named quality control manager; **Dennis L. Scott** manufacturing engineer; and **Charles E. Reed** purchasing agent.

Frederick A. Twomey was appointed vice president, **Royal Industries Inc.**, Los Angeles. He will direct sales activities.

Francis E. Smith was appointed midwest regional sales manager, Alloys & Metals Div., **Tennessee Products & Chemical Corp.**, with headquarters at Chicago. He was eastern sales manager for Chromium Mining & Smelting Co.

Vac-U-Lift Co., Salem, Ill., division of Siegler Corp., appointed **John Watson** to be in charge of the sales office; **Richard Warfel**, sales engineering; **Fay Murphy**, product design; **Charles Boger**, engineering; and **Lou Gruenkemeyer**, manufacturing and purchasing.

Townsend Co., New Brighton, Pa., appointed **Robert W. Lehner** sales manager of the Central Div. and **A. W. Livorine** Detroit sales representative.

Timken Roller Bearing Co., Canton, Ohio, promoted **C. L. Simpson**, former assistant auditor, to auditor. In STEEL's July 20 issue, it was incorrectly stated that **G. L. Deal**, secretary-treasurer, was promoted to auditor.

Frederick P. Huston was appointed assistant chief engineer for **Tube Reducing Corp.**, Wallington, N. J. He was chief methods engineer.

J. J. Curry was named midwest regional sales manager, **Yale Materials Handling Div.**, Yale & Towne Mfg. Co., Philadelphia. He will supervise factory sales and service branches and franchise representatives in Michigan, Ohio, Indiana, and Kentucky.

Heinz Hanau was named director of engineering and research, Western Div., Compton, Calif., **Industrial Tectonics Inc.** He was supervisor of aircraft projects, New Departure Div., General Motors Corp.

John W. Decker was made sales manager, **Shear-Speed Chemical Products Div.**, Hazel Park, Mich., Michigan Tool Co.

Arthur E. Smith was promoted to the new position of merchandising manager of the Marketing Div., **Minneapolis-Moline Co.**, Hopkins, Minn. He was manager of marketing services.

William T. Cherry, former manager of application engineering, was named west coast district manager, **Formsprag Co.**, with headquarters in Los Angeles.

Thew Shovel Co., Lorain, Ohio, appointed **R. T. Maynard**, former export sales manager, to the new post of contract sales manager.

H. C. Siler was named general sales manager, **Utility Appliance Corp.**, Los Angeles. He was western division sales manager.

John J. Sedlacek was named manager of the Philadelphia district sales office, **I-T-E Circuit Breaker Co.**, Philadelphia. He was Minneapolis district sales manager.

Harold H. White was named director-blasting practices and explosives research, **Vulcan Materials Co.**, Birmingham.

Dow Chemical Co., Midland Mich., made **Fred K. Quigley Jr.** staff manager of coating materials, Plastics

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PAUL R. ELLIS
ACF Industries works mgr.

EDWARD L. BADWICK
Accurate Specialties mgr.

THOMAS E. THORPE
Republic Steel asst. supt.

ANDREW C. BAYLE
Waltham Precision v. p.

WILLIAM H. COMBS
Great Lakes Carbon v. p.

WILLIAM L. RODICH
Continental-Diamond president

Dept. He was assistant manager of Coatings Technical Service.

Andrew C. Bayle was elected vice president-engineering at **Waltham Precision Instrument Co.,** (formerly Waltham Watch), Waltham, Mass. Before joining Waltham Precision in 1958 as director of engineering, he spent several years at Vectron Inc., where he was chief engineer and assistant to the president.

W. E. Montgomery was made chief engineer, Carbide Div., **Firth Sterling Inc.,** Pittsburgh.

Braeburn Alloy Steel Corp., Braeburn, Pa., appointed **Fred E. Allison Jr.** co-ordinator of market research and development.

R. K. Carpenter was made superintendent of metallurgy for Electrolytic Div., **American Zinc Co. of Illinois,** subsidiary of American Zinc, Lead & Smelting Co., St. Louis.

Unimet Carbides Div., United-Greenfield Corp., appointed **Leonard F. Joseph** factory representative for Michigan. He is at Detroit.

William H. Combs was elected a vice president of **Great Lakes Carbon Corp.,** New York. He continues as general manager of the Missouri Coke & Chemical Div., St. Louis.

William L. Rodich was appointed president, **Continental-Diamond Fibre Corp.,** subsidiary of Budd Co., Philadelphia. He was vice president-operations at Celotex, Chicago.

Arthur F. Loveland was made works manager, Berwick, Pa., plant, **American Car & Foundry Div.,** ACF Industries Inc. He was assistant works manager.

Robert E. Halloran was named Pacific Coast sales manager, Tubular Products Div., **Babcock & Wilcox Co.** He is in Los Angeles where he succeeds **H. F. Lefferty,** retired. **Thomas W. Wright** was named assistant manager, New York district sales office.

Walter R. Derlacki was made assistant research director, **Luria Bros. & Co. Inc.,** New York. He was with Procter & Gamble Co.

Paul R. Ellis was appointed manager of the South Albuquerque, N. Mex., Works of **ACF Industries Inc.** He was manager of the division's Product Engineering Dept.

Edward L. Badwick was named plant manager of a new semiconductor component facility, Hackensack, N. J., by **Accurate Specialties Co.** He was a production engineer with Bendix Aviation Corp.

Thomas E. Thorpe was named assistant superintendent of the cold strip mill at the Gadsden, Ala., plant of **Republic Steel Corp.** He was general foreman of the cold strip mill.

Lawrence G. Blackmon was made manager, Phoenix, Ariz., Works, **Capital Foundry Div.,** National Malleable & Steel Castings Co. He replaces **B. J. Aamodt,** who was assigned special duties. **Robert D. Everett** replaces Mr. Blackmon as manager of the Sharon, Pa., Works. **Edward O. Spahr** replaces Mr. Everett as general superintendent at Sharon.

OBITUARIES...

Roy Thal, 84, founder and chairman, **Inshield Die & Stamping Co.,** Toledo, Ohio, died July 22.

Alvin Pellman, 67, vice president and factory superintendent, **Cream City Boiler Co.,** Milwaukee, died July 20.

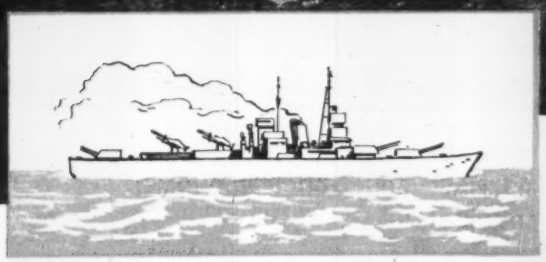
Stanley A. Richardson, 67, president, **Weston Machinery & Tool Ltd.,** Toronto, Ont., died July 23.

Jacob P. Bertram, 75, former president, **Rochester Can Co.,** Rochester, N. Y., died July 22.

Thomas F. Kearns, 55, president, **General Steel Products Corp.,** Flushing, N. Y., died July 20.

James L. Morrison, 85, founder and president, **Morrison Machine Co.,** Paterson, N. J., died July 20.

Joseph C. Enderle, 64, president, **Ivan Sorvall Inc.,** Norwalk, Conn., died July 22.



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Metalworking Firms Allot Additional Funds for R&D

COMPANIES engaged in metalworking continue to pour millions of dollars into research and development programs. Expenditures are being made by primary metal producers and fabricators to strengthen their competitive positions, to broaden product lines, and to develop new processes and materials.

Here are some of the latest developments along those lines:

• **Du Pont Co.**—A fully equipped metallurgical research center will be built at the Baltimore plant of E. I. du Pont de Nemours & Co. Inc. to speed development of high temperature metals for jet engines, rockets and missiles, atomic power generators, and other hardware of advanced design.

The installation will contain equipment to forge, extrude, roll, draw, and heat treat such refractory metals as columbium, tantalum, titanium, zirconium, tungsten, and chromium. It will be able to turn out mill products (ingots, tubes, rods, sheets, strip, and foil) for sales development programs.

"Rapid advances in new and revolutionary technology in industry, power generation, transportation, and communications have created a demand for new metals with outstanding physical properties," says F. H. Weismuller, general manager of Du Pont's Pigments Dept. "Designers of rockets and jet engines, for example . . . need structural metals that will withstand temperatures well above 2000° F, that have a low neutron absorption, and that will operate without impairment in highly corrosive conditions. There are known metals and alloys with unique high temperature strength, corrosion resistance, and nuclear properties. But many of them are not commercially available. These are the refractory or high melting metals, like columbium."

Equipment in Du Pont's research center will include forging and extrusion presses, hot and cold rolling mills, and various furnaces.

• **American Metal Products Co.**—This Detroit firm is constructing a research, engineering, and development center at Ann Arbor, Mich. It will be operated by the company's Engineering Science Div. whose objective is to reduce theory to manufacturing process with a minimum number of research and development steps.

The center will contain high temperature enclosures to develop and evaluate new Space Age materials, laboratories for metallurgical and chemical research, engineering facilities, and equipment for production, testing, and evaluation of nuclear and high temperature materials.

• **International Harvester Co.** — Expenditures for engineering and research have increased about 260 per cent in the last ten years (about $14 million in 1949 to over $36 million in 1959, not including government work). Part of the increase, says F. W. Jenks, Harvester's president, represents effects of inflation, but even in dollars of constant value the increase is more than 200 per cent.

The company has officially opened its Farm Equipment Research & Engineering Center at Hinsdale, Ill. It cost more than $5 million and has more than 10 acres under roof. It will house nearly all of the scientific and technical staffs responsible for designing and testing Harvester's tractors and farm implements and for farm equipment advance engineering. All product engineering, except that carried on at the company's East Moline, Ill., and Memphis, Tenn., farm equipment plants, also will be centered at Hinsdale.

Builds Heat Treating Unit

General Electric Co., Schenectady, N. Y., is building a huge heat treatment facility for the manufacture of cases for solid propellent rocket motors at Evendale, Ohio. When completed in March, 1960, GE's Flight Propulsion Laboratory Dept. will be able to process rocket cases up to 30 ft long and 10 ft in diameter. Provision will be made to expand the facility to handle cases up to 40 ft long. Cost: Over $1 million.

Adds Galvanizing Line

Colorado Fuel & Iron Corp., Denver, has added a galvanizing line at the wire mills of its Pueblo, Colo., plant to increase supply of heavy galvanized wire. Larger weight and diameter coils can be furnished. Two of the galvanizing units at the plant (including the new one) produce charcoal wipe wire; the other three, asbestos wipe wire.

Standard Fuel Expands

Standard Fuel Engineering Co. has completed construction of new facilities in its Detroit plant. The project included additional bins for the storage of raw materials, larger crushing and screening equipment, and additional storage space for the finished products of its Zero Refractories Div.

Plans Canadian Foundry

Norwood Foundry Ltd., Saskatoon, Sask., is building a $110,000 foundry in Regina, Sask. The plant will produce a wide range of castings, including: Water and sewer installation materials, pipe fittings, manholes, valve boxes, domestic service boxes, tank heaters, feed cookers, post mauls, and tractor weights.

Forms Canadian Subsidiary

Reliance Electric & Engineering Co., Cleveland, purchased a 41,000 sq ft plant in Stratford, Ont. It represents the first step in a $1 million capital investment program. The new property will be operated by a subsidiary, Reliance-Reeves-Master Ltd. The plant will make Reliance drives and electronic controls and Master gear motors. Another Canadian subsidiary, Reliance Electric & Engineering (Canada) Ltd., Toronto, Ont., makes electric trans-

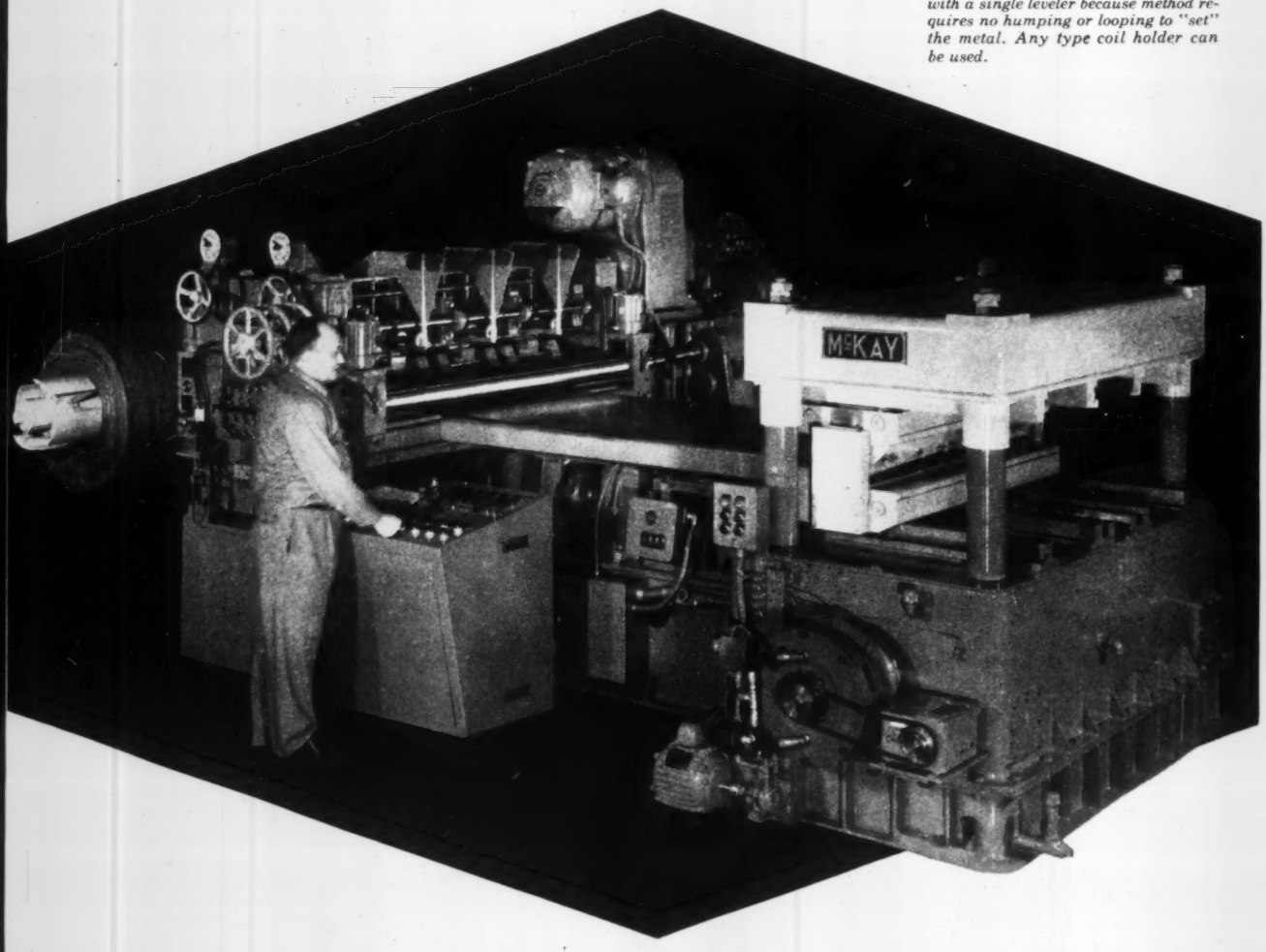
(*Please turn to Page* 112)

AUTOMATIC, INSTANTANEOUS *because of highly accurate electronic counting and measuring mechanisms. Operator simply sets length and quantity by push buttons, shear does the rest. Punched tape or coded card control available.*

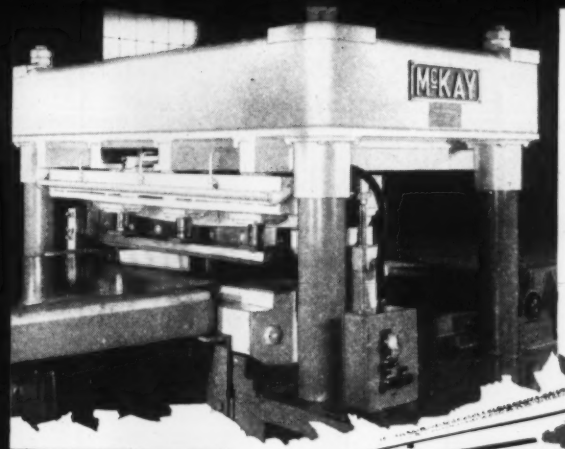
LOW MAINTENANCE *because all drives and controls are simplified AC type, electronic controls are proven standards, cutting dies are standard double-rake shear knives.*

Break

COMMERCIALLY FLAT SHEET *is possible with a single leveler because method requires no humping or looping to "set" the metal. Any type coil holder can be used.*



COMPACT . . . *never before has such a high production unit required so little area. Space saving, it's ideal for warehouse operations.*



through...

in AUTOMATIC SHEARING

Revolutionary McKaymatic* high production Die Shear line instantly responds to length and Quantity Command

Now—a high production cut-to-length line that meets *all* the requirements of modern day coil shearing. It's the revolutionary new McKaymatic* Die Shear Line and it's fast, extremely accurate, instantly adjusted, compact and relatively low in cost!

The McKaymatic* is applicable for use wherever sheet metal is used. Ferrous and non-ferrous mills, fabricators or warehouses should see this amazing new line before they decide on the purchase of new coil shearing equipment.

UNMATCHED FLEXIBILITY offered by a simplified electronic control makes the changing of length of cut instantaneous. When length and quantity commands are changed (manually or automatically) the line reacts instantaneously without slowing down or stopping. EXACTING ACCURACY, also a product of electronics, is equal to or better than any other available equipment. HIGH PRODUCTION, regardless of the number of length changes is possible because there is no downtime for length changing, etc. LOW MAINTENANCE is possible because the line is designed around simple AC drives and controls, and proven electronic components.

There's nothing like it—for large orders or small—in any width or thickness. Here for the first time is practical push button shearing, and it's easily adapted for standard coded card or punched tape systems. For details write today. *The McKay Machine Company, Youngstown 1, Ohio.* *TM

McKAY MACHINE

(*Concluded from Page* 109)

formers and motors at its plant at Welland, Ont.

Lenz Doubles Capacity

Lenz Co., Dayton, Ohio, maker of steel tube, pipe, and hose fitting products, has more than doubled the capacity of its plant at 3301 Klepinger Dr., that city.

Moreland Enlarges Plant

Moreland Corp., maker of printing and industrial rollers, has enlarged its Willow Grove, Pa., plant by nearly 30 per cent. The addition was constructed by William F. Lotz Inc., Philadelphia.

ASSOCIATIONS

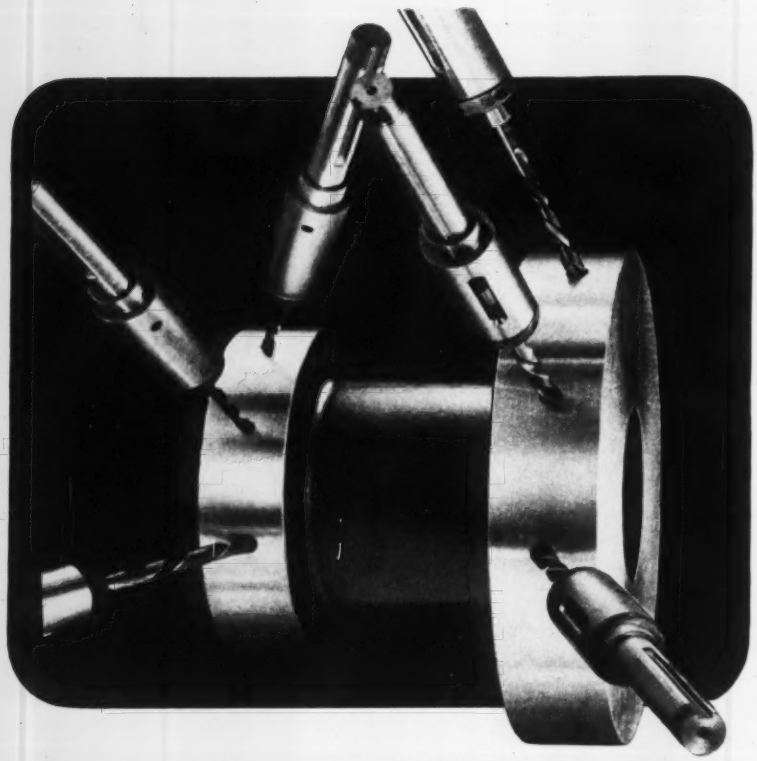
Walter Crafts, associate director, technology, Union Carbide Metals Co., Niagara Falls, N. Y., a division of Union Carbide Corp., has been named president of the **American Society for Metals**, Cleveland. Other nominations include W. A. Pennington, professor of metallurgy, University of Maryland, College Park, Md., vice president; and R. J. Raudebaugh, International Nickel Co., New York, treasurer. Elections will be held Nov. 4.

Dr. P. H. Margulies, Central Research Laboratories, Food Machinery & Chemical Corp., Princeton, N. J., is president-elect of the **Etched Circuits Society**, New York. Wallace Moore, Sibley Co., Haddam, Conn., is the incoming president.

NEW OFFICES

Pyle-National Co., Chicago, opened a district sales office in the Comer Bldg., Second Avenue and 21st Street N., Birmingham, Ala. E. P. Callahan is district manager.

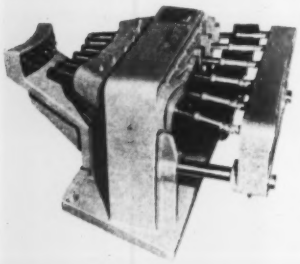
R. C. Mahon Co., Detroit, opened branch offices in the Pacific Bldg., San Francisco, and at 2303 Jefferson St., Torrance, Calif. The offices under the managership of Dave Parker at San Francisco and J. G. Ingels at Torrance will handle



Can you drill this
PERIPHERAL HOLE-PATTERN
at a profit?

U.S. Drill Head engineers can show you the cost-reducing way to do these tough jobs—just as they did for a missile manufacturer, producers of automotive parts, diesel engines, and in many other industries.

New products of the space age continually bring new manufacturing problems. Take advantage of U.S. Drill Head Co.'s leadership in applying multiple drilling and tapping heads to your drilling operations.



U.S. Fan-Shaped Heads for peripheral drilling — full ball bearing shaft mounting, shaved gears, super-finish spindles, full torque, maintained precision.

US DRILL HEAD

Adjustable and Fixed Center Multiple Drilling Heads.
Individual Lead Screw Multiple Tapping Heads.

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HAVE YOU A HEAT TREATING PROBLEM?

Take it to your Commercial Heat Treater for:

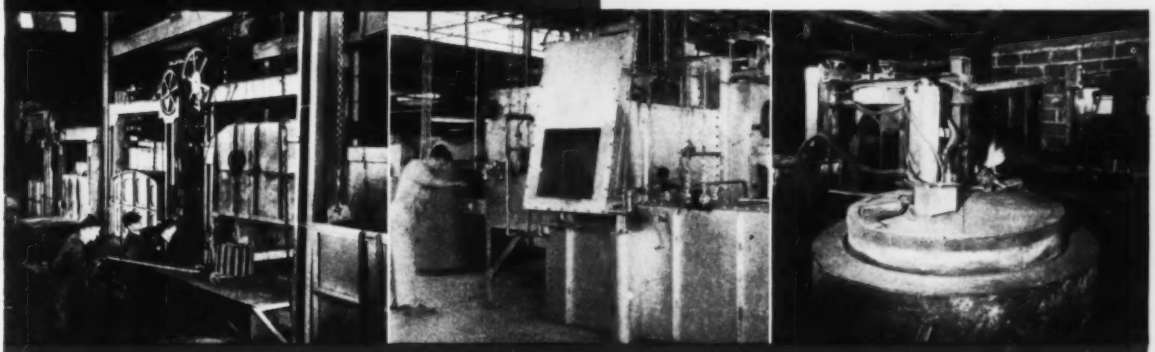
DESIGN: Technical advice about the *design* of metal parts requiring heat treating.

PROCESS: Facts as to the correct heat treating *process* required to achieve service requirements.

EQUIPMENT: The variety of modern specialized *equipment* needed for efficient cost saving operations.

SKILLS: The operational *skills* developed by years of experience in all phases of ferrous and non-ferrous metal treatments.

All these add up to SERVICE — the type of service only the Commercial Heat Treater can provide.



Consult your Commercial Heat Treater about your design or specification problems

American Metal Treatment Co.
Elizabeth, New Jersey
Anderson Steel Treating Co.
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Benedict-Miller, Inc.
Lyndhurst, New Jersey
Bennett Heat Treating Co., Inc.
Newark 5, New Jersey
Cook Heat Treating Co. of Texas
Houston 11, Texas
Dayton Forging & Heat Treating Co.
Dayton 3, Ohio
Dominy Heat Treating Corp.
Dallas, Texas
Fred Heinzelman & Sons, Inc.
New York 12, New York
Alfred Heller Heat Treating Co., Inc.
New York 38, New York
Ipsenlab of Rockford, Inc.
Rockford, Illinois
L-R Heat Treating Co.
Newark 5, New Jersey
Metallurgical, Inc.
Minneapolis 14, Minnesota
Metallurgical, Inc.
Kansas City 8, Missouri
Owego Heat Treat, Inc.
Apalachin, New York
Paulo Products Co.
St. Louis 10, Missouri
Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania
Queen City Steel Treating Co.
Cincinnati 11, Ohio
J. W. Rex Co.
Lansdale, Pennsylvania
The Stanley P. Rockwell Co.
Hartford 12, Connecticut
Scott & Son, Inc.
Rock Island, Illinois
Syracuse Heat Treating Corp.
Syracuse 3, New York
Temperature Processing Co., Inc.
North Arlington, New Jersey

CANADA

Ipsenlab of Canada Limited
Toronto 16, Ontario

BISHOP Tubular Products NEWS

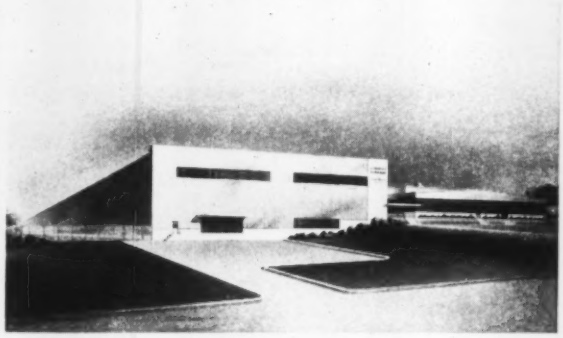
"METALS FOR PRECISION AND PERFORMANCE"

GOLD-CLAD STAINLESS TUBING CURBS CORROSION IN REACTOR

Photo pictures insertion of gold-clad stainless steel heat exchanger into gold-clad power reactor at AEC's Los Alamos Scientific Laboratory. Completely successful in recent operational tests, the unique reactor is designed to produce superheated steam in a single pass. This is the second experimental reactor using uranyl phosphate fuel—the first unit failed because of excessive corrosion in the heat exchanger. Gold-cladding now protects all structural parts in contact with the extremely corrosive solution.

Will clad metals solve *your* corrosion problems? Investigate the BISHOP line of clad metals. BISHOP was the first company to successfully produce gold-clad stainless tubing . . . coupon brings data. Use it.

NEW BISHOP TUBE MILL OPENS



Sketch shows new BISHOP facilities adjacent to the present tube mill in East Whiteland Township, west of Paoli, Penna.—completing the first stage in BISHOP'S long range expansion program. This two-story structure will contain over 165,000 square feet of floor space. BISHOP platinum mechanical manufacturing operations also move to the East Whiteland plant.

BISHOP NOW DRAWING .002" WALL TANTALUM TUBING

Tantalum tubing with paper-thin wall thicknesses is now being supplied by BISHOP on special order. Sizes range from .062 in. OD x .002 in. wall to 1.5 in. OD x .125 in. wall. Columbium (niobium) tubing down to .002 in. wall has been produced and is also available. Can tubing of these "exotic" metals be the answer to any of your design problems? Check with BISHOP . . . use the coupon.

J. BISHOP & CO.

platinum works

FOR HELPFUL DATA USE THIS HANDY COUPON

- ☐ Tubular Produc's Bulletin No. 12
- ☐ Platinum Products Catalog No. 4
- ☐ Clad Metal Data
- ☐ Special Tubing Data

Check information you'd like and mail to
J. BISHOP & CO.,
30 King St., Malvern, Penna.

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City Zone State

Tubular Products Division

30 KING STREET, MALVERN, PENNA.

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THIS IS THE BISHOP LINE:

Products of all the Platinum Metals... Small diameter Stainless Steel, nickel and special alloy tubing

sales of fabricated structural steel, metal roof decks, cellular floor and acoustical ceiling assemblies, insulated metal curtain walls, and other building products.

Menlo Research Laboratory, San Jose, Calif., opened an engineering and design office at 595 N. Mathilda Ave., Sunnyvale, Calif. Charles Weeks is director of the electronics and engineering firm.

NEW PLANTS

Waco Mfg. Co., Minneapolis, will open soon its new 48,000 sq ft plant at 9555 Irving Park Rd., Schiller Park (Chicago), Ill. The plant will house the Form Div., producer of prefabricated concrete forms, and the Porter Div., producer of gymnasium and playground equipment.

Water Tube Boiler & Tank Co. dedicated its 57,000 sq ft plant at 4343 S. Oakley, Chicago.

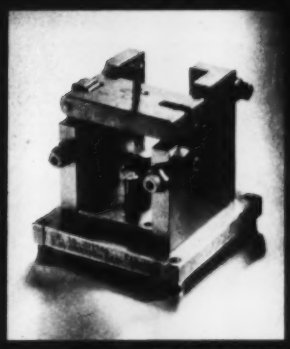
Michigan Chemical Corp., St. Louis, Mich., opened its plant at Port St. Joe, Fla. Products will include high purity chemical and refractory grades of magnesium oxide.

American Potash & Chemical Corp., Los Angeles, has begun full production at its Henderson, Nev., plant. Output consists of anhydrous lithium chloride for use in metal products manufacturing and other industrial applications.

Limited pilot production is underway in the $10 million truck and axle plant established jointly in Sao Paulo, Brazil, by Rockwell-Standard Corp., Detroit, and Companhia Brasileira del Material Ferroviario, Sao Paulo. The new company is known as **Cobrasma Rockwell Eixos S/A.** Construction of the plant has been completed and installation of about 500 machine tools (98 per cent of U. S. origin) is well along. The 250,000 sq ft plant can produce all sizes and types of truck axles and gears for any transmission or truck axle built in the U. S. or South America. Its gear production capacity will be about 30,000 a month. The plant

(*Please turn to Page* 118)

Tooling with tape...



This drill jig: $280.00

This drill jig: $4.20

you can see the profit in point positioning with DIGIMATIC* model 202 Point-Positioning System

Ask us to arrange a demonstration with **your** parts.
Write for free 12-page booklet, "DIGIMATIC MODEL 202."
Also—movies shown at your shop or plant on request.

The lowest-cost complete point-positioning system for drilling, tapping, reaming, spot facing

*DIGIMATIC IS OUR TRADEMARK

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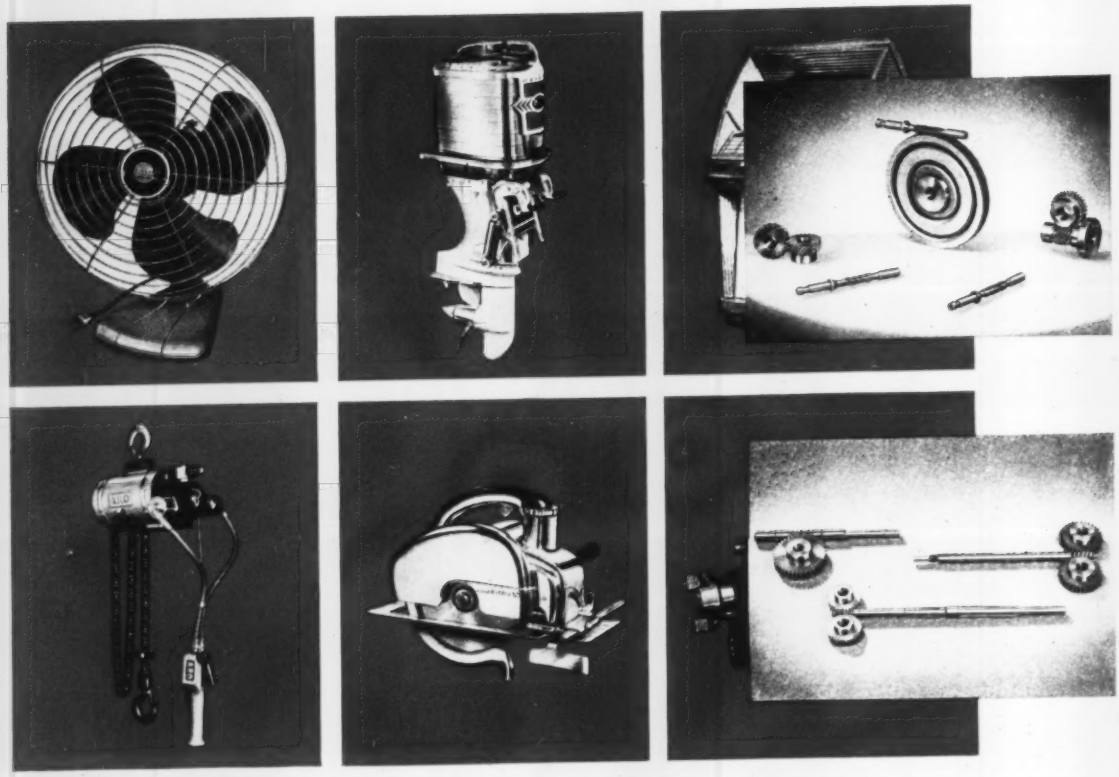
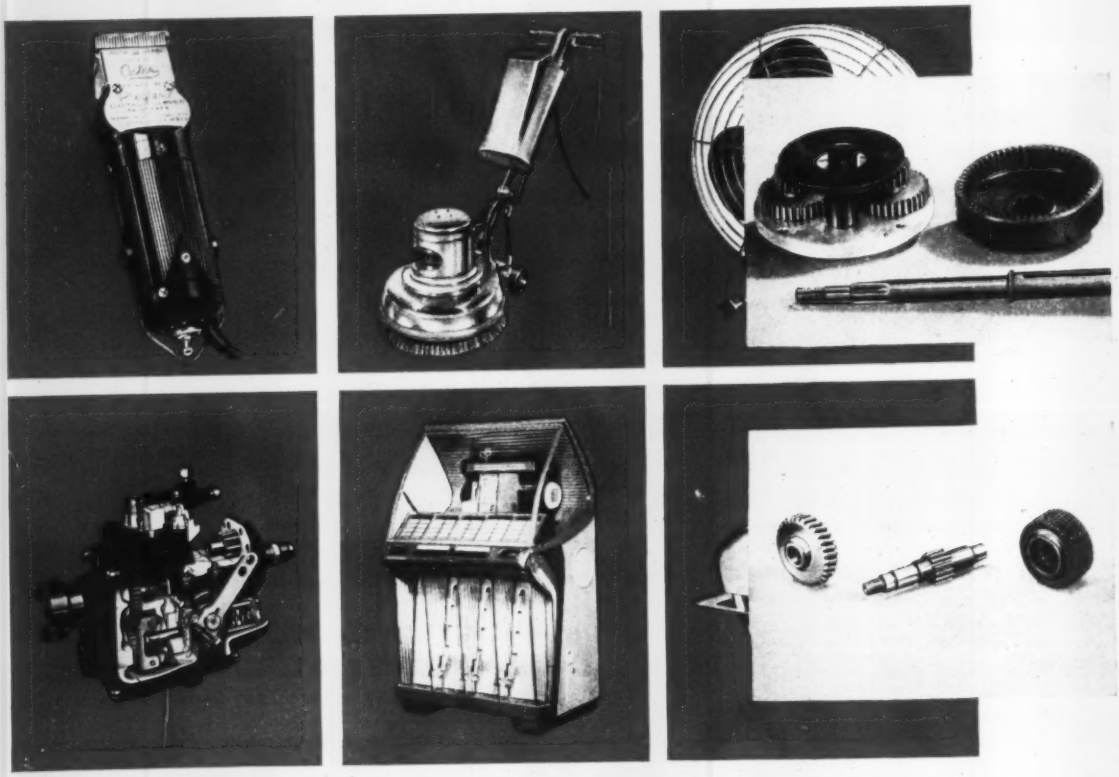


for Appliances ★ Electric Motors ★ Computers ★ Missiles ★



APPLIANCES AND MACHINERY WITH NAMES YOU KNOW DEPEND ON G.S. SMALL GEARS

Have you an especially difficult, especially complex, especially critical power transmission link in your production chain, involving Fine or Intermediate Pitch Gearing? Have you been penalizing yourself with short-run production—at short-run high cost—to assure yourself of the custom precision you require? Then G.S. has a great deal to offer you.

G.S. takes great pride in the long, long list of customers who have relied on our ability and our performance for many years to supply all or the major part of their Small and Intermediate Gearing requirements. The most famous leaders in a dozen major industries are old friends—along with hundreds of smaller but mighty important producers of quality units.

A supplier has to do more than just "make gears" to develop and maintain such a business. For one thing, he must develop a staff of outstanding experts in all the phases of design and manufacture of his specialty; for another, he must maintain a sincere interest in the solution of the problems of his customers, large or small—not just a yen for another order; and third, he must be able to consistently deliver custom quality under the most demanding conditions—*at full-run production prices.*

Now well into our fifth decade of specialization, G.S. is *the world's largest exclusive manufacturer of fractional horsepower gearing*—with the most modern, most complete, most efficient manufacturing equipment and production techniques you can find, to implement our mounting years of practical experience.

We invite your inquiry about what G.S. might do for you—in terms of potential savings, improved product performance and useful life, fewer costly interruptions to your production lines because of over-variance from specifications. Our engineers are at your service to discuss development of new projects, or better means of accomplishing old ones. Call or write us today.

and all precision requirements ★ Custom-Quality Small Gearing by

YOU'LL FIND G.S. GEARING IN TOP QUALITY PRODUCTS LIKE THESE . . .

Adding Machines • Aircraft Carburetors & Fuel Metering Systems • Aircraft Instruments and Radios • Automatic Musical Instruments • Automation Systems • Business Machines • Check Signing & Protecting Machines • Clippers for Barbers, Animal Shearing & Hedge Trimming • Cloth Cutting Machines • Coin Changers & Counters • Communication Equipment • Control Mechanisms • Electric Fans • Electric Motors • Floor Polishers, Sanders, Scrubbers, Sweepers • Food & Drink Mixers, Blenders • Home Appliances • Lawn Sprinklers • Machine Tools • Meat Tenderizers, Grinders, Slicers • Military Equipment • Motion Picture Cameras & Projectors • Optical Instruments • Outboard Motors • Pneumatic Production Tools • Radio & Radar Tuning Assemblies • Radio Anti-backlash Gears • Range Finders • Record Changers • Sewing Machines • Steel Strap Stretchers • Step Switches • Tapping, Drilling & Threading Equipment • Telephone Dials • Television Sets • Thermostatic Controls • Typewriters • Vending Machines • Washing Machines.

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FRACTIONAL HORSEPOWER GEARING

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SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING

43 Years of Specializing in Small Gearing!

Punches & Dies

Since 1903

Made to highest standard and uniform quality thus insuring maximum service.

In Stock
Round, Square, Oblong Punches and Dies, Rivet Sets
Write Dept. A for catalog 60 and new stock list

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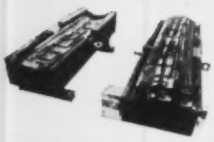
TOOL FABRICATORS



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PATTERN MAKING

SPECIALISTS IN **PLASTICS TOOLING FORMULATIONS**

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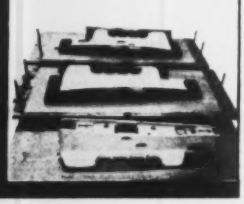
FOUNDRIES



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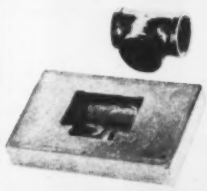
MACHINISTS



(*Concluded from Page* 115)

will be able to produce axles with either stamped or cast steel housings and hubs, a steel foundry being included in the Cobrasma plant. Machines and tooling represent an investment of $7.5 million.

NEW ADDRESSES

General Cable Corp. has relocated its headquarters offices. Headquarters sales and manufacturing departments will be moved to 730 Third Ave., New York 17, N. Y., from Perth Amboy, N. J. The New York branch sales office will remain at 420 Lexington Ave., New York 17, N. Y.

Alco Products Inc., Schenectady, N. Y., moved its Pittsburgh district office to 875 Greentree Rd., Pittsburgh 20, Pa.

Graver Tank & Mfg. Co., East Chicago, Ind., moved its branch sales office to 2570 S. Harvard St., Tulsa 14, Okla. Graver is a division of Union Tank Car Co., Chicago.

Thompson - Ramo - Wooldridge Products Co., a division of Thompson Ramo Wooldridge Inc., moved its home office to 202 N. Canon Dr., Beverly Hills, Calif.

Seabreeze Mfg. Ltd. is moving its facilities to a new plant on Jutland Avenue, Etobicoke (Toronto), Ont.

R. B. Denison Mfg. Co., maker of heavy duty and precision limit switches, moved into its new plant at 386 Broadway, Bedford, Ohio.

Flick-Reedy Corp. moved into its new $2.3 million plant and office in Bensenville, Ill. The 220,000 sq ft structure provides ample room for expansion and for its Miller Fluid Power Div. and Tru-Seal Div. The firm produces industrial hydraulic and air cylinders and pipe-thread sealing units.

New Hermes Engraving Machine Corp. and its subsidiary, **Hermes Plastics Inc.**, moved to 154 W. 14th St., New York 11, N. Y.

James Hunter Inc., a subsidiary of James Hunter Machine Co., North Adams, Mass., moved to

DOW | MAGNESIUM PRODUCTS

ARE YOU GETTING ALL THESE BENEFITS WITH YOUR MAGNESIUM CASTINGS?

Dow magnesium foundry offers experience, production capacity for sand and permanent mold castings of all sizes and shapes.

The unique capabilities of Dow's Bay City, Michigan, foundry help users of magnesium sand and permanent mold castings. Activities at this facility—largest and best equipped of its kind—run the gamut from large volume production jobs to one-shot "specials".

Huge or tiny castings. The foundry is capable of producing castings weighing in excess of 3,000 lbs. down to ounces—in all degrees of complexity. Experienced pattern engineers ensure that the best use of casting processes is made. This can result in either lower costs, improved quality, better deliveries, or a combination of all three.

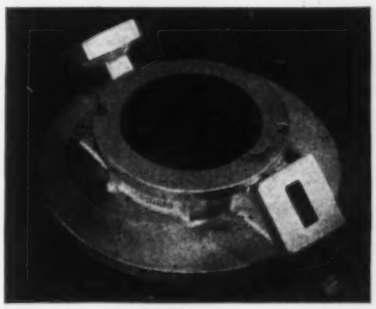
Newest techniques. Many milestones in magnesium casting have been reached at this Dow foundry. In fact, Bay City has men permanently assigned to developmental work, keeping the foundry in the forefront of technological advances at all times.

Results of their work include special processes for cast-in inserts and tubeless passages, and improved melting techniques. Casting methods have been developed for many of the newer magnesium alloys, such as the elevated temperature group and the new high damping capacity alloy, K1A.

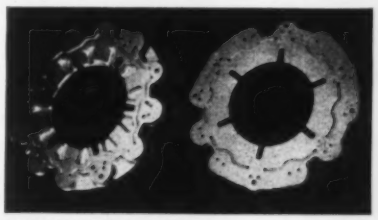
Quality control. A full time quality control team exhaustively checks all work, from alloy composition to the shipping dock. A direct-reading spectrometer makes rapid alloy composition analyses. Its speed is particularly valuable when alloying elements that are hard to hold in the molten state, such as thorium, are present. Chemical analysis is also frequently employed.

Testing facilities. Molding and sand cores are analyzed as a regular part of casting quality control. Radiography, fluorescent penetrant inspection and other testing facilities are used to check properties and specifications.

Experienced magnesium team. The foundry often draws upon the broad range of specialized experience available throughout the company. To Bay City customers, this means assurance of high quality work, done with utmost efficiency and economy. If your requirements involve magnesium castings, Dow can help you arrive at optimum casting design and reliably supply your production requirements.



THIS SAND CAST WAVE GUIDE was held to ±.005" on passageway dimensions. Surface smoothness requirements are 63 RMS. The foundry has government approval for any phases of its operations where such approvals are applicable.



THIS BRAKE CARRIER is sectioned to show how the hydraulic lines were integrated by use of tubeless passageway casting techniques.

WRITE TODAY for this illustrated brochure discussing Dow foundry services. THE DOW CHEMICAL COMPANY, Midland, Michigan, Magnesium Product Sales Dept. 1303LE8-10.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

BOILER TUBES POWER BRUSHED CLEAN prior to welding. Automatic machine setup inserts end of tube between Osborn brush rolls . . . cleans rotating tube on pre-set time cycle . . . stops and ejects . . . repeats operation.

SOLVED

with OSBORN Power Brushing

Before these boiler tubes can be induction welded—scale and hardened preservative oil must be removed.

This manufacturer does the job simply . . . efficiently with fast, automatic Osborn Power Brushing.

Quality and uniformity of the finished tubes are excellent . . . to help assure strong welds. *Cost is less* than the former blast-cleaning method, and the operation is *cleaner*, too . . . no flying grit.

This is typical of the many new . . . varied—and often unique—metal cleaning and finishing operations being done throughout industry by modern Osborn Power Brushing.

An **O**sborn **B**rushing **A**nalysis—made in your plant now—can *pinpoint new savings* for you, too. Write us for details. *The Osborn Manufacturing Company, Dept. S-10, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN

POWER, PAINT AND MAINTENANCE BRUSHES
METAL FINISHING MACHINES . . . AND FINISHING METHODS
FOUNDRY PRODUCTION MACHINERY

Mauldin, S. C. The firm makes textile machinery, automatic blending systems, and fiber processing machinery.

CONSOLIDATIONS

American Hoist & Derrick Co., St. Paul, acquired **Hetherington & Berner Inc.**, Indianapolis, maker of asphalt plants and paving machinery. D. R. Berner is general manager of the new subsidiary.

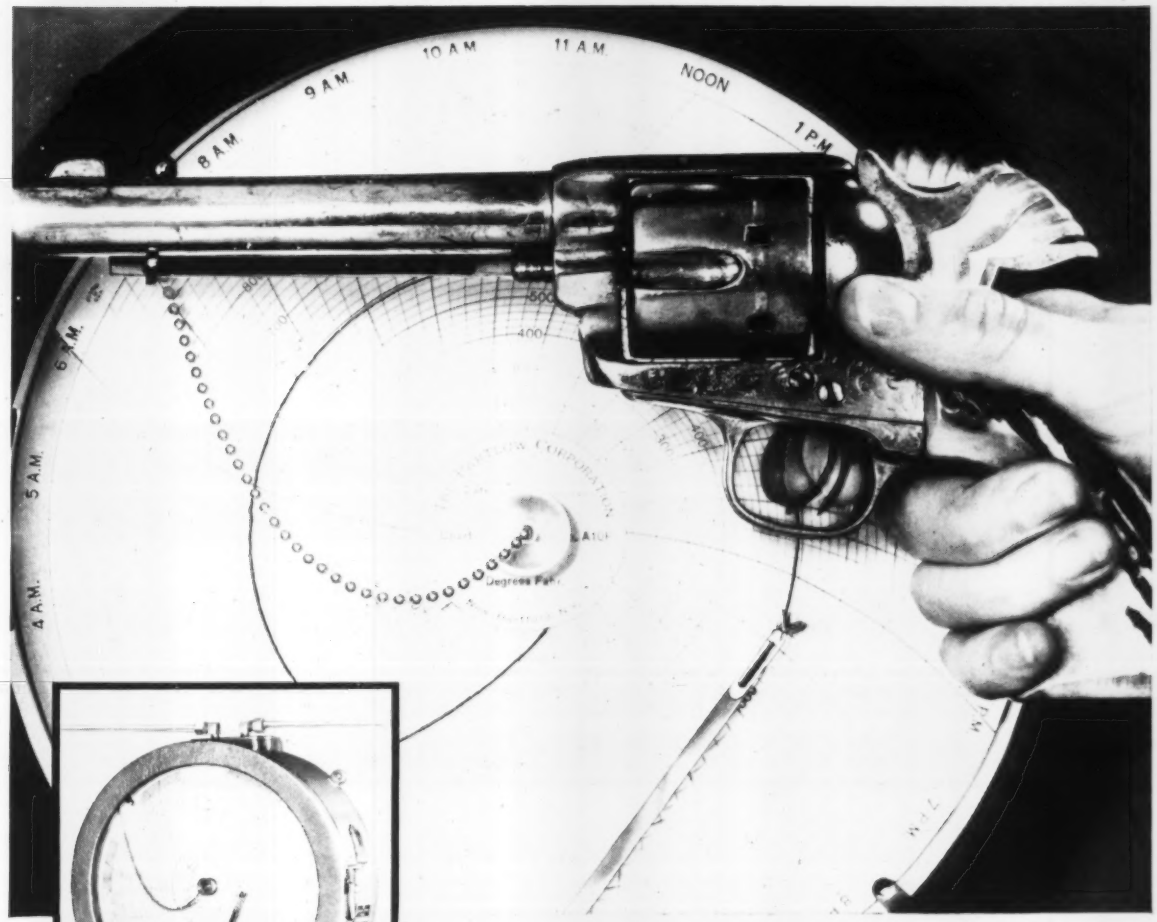
Republic Supply Co. of California, Los Angeles, purchased **Tubesupply Inc.**, Seattle, a steel and aluminum tubing distributor, and will combine its operation with that of Perry Kilsby Inc., a recently acquired Republic division. John DeYoung will serve as manager.

Negotiations are underway for merger of **Calumet & Hecla Inc.**, Chicago, and **Flexonics Corp.**, Maywood, Ill., manufacturer of flexible metal and synthetic hose products, metal bellows, expansion joints, compensators, and ducting assemblies. Calumet & Hecla fabricates nonferrous metal tube and parts; operates copper and uranium mines; conducts extensive lumbering operations; and recently entered the magnesium production field by becoming a major owner of Alabama Metallurgical Corp., Selma, Ala.

Macwhyte Co., Kenosha, Wis., purchased **Pacific Wire Rope Co.**, Los Angeles, and will operate the property as a separate company. Kellog Spear is president and general manager of the California firm.

Ensign Carburetor Co., Fullerton, Calif., has been acquired by **American Bosch Arma Corp.**, Hempstead, N. Y., and will be operated as a subsidiary. Ensign products include carburetion equipment and regulators.

Stauffer Chemical Co., New York, and **Victor Chemical Works**, Chicago, will merge, subject to approval of stockholders. Victor operations would be carried on as the Victor Chemical Div. with Rothe Weigel as president and general manager of the division.



The Control Geared for

HAIR TRIGGER RESPONSE

even to Fractional Changes in Temperature!

NEW *Recording Pneumatic Temperature Control, Model RVA, available in any of 10 ranges from -30° to 1100° F.*

Extreme sensitivity—reflected in lightning-fast reaction to temperature changes—is a characteristic of *all* Partlow controls. Partlow Recording controls, however, *prove it in writing* . . . You can see for yourself how exceptional bulb sensitivity, teamed with advanced mechanical design, provide a minimum of "saw-toothing" on start-up, and maintain a rigid line of control when temperature reaches a predetermined set point.

Instant response, of course, is just one of Partlow's many built-in advantages. Another is rugged *design simplicity* that does away with hair springs and delicate electronic gadgets . . . that requires no electronic amplification . . . that permits fast, "screwdriver" replacement of the thermal element *right out in the field.*

If you use or manufacture process equipment within the -30° to 1100° F. range, there's a Partlow Pneumatic, electric or self contained gas control to fit your application *precisely*. Recording, indicating and non-indicating models available. For full details write The Partlow Corp., New Hartford, New York, Dept. S-859. Export Ad. Auriema, Inc., 85 Broad St., New York 4, N. Y.

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PARTLOW

TEMPERATURE CONTROLS

PONTIAC fender, formed in a severe, one-hit drawing operation, is made of J&L drawing quality, cold rolled oiled sheet.

INTERNATIONAL HARVESTER utilizes the strength of J&L steel in rugged earth moving equipment manufactured by Construction Equipment Division.

E. F. HAUSERMAN COMPANY secures uniform flatness from coils of J&L sheet steel for its colorful, versatile movable wall partitions.

So easy to form, so flat, so strong, so uniform...

no wonder so many of America's leading manufacturers use

J&L sheet steel

TAKE PLANNED ADVANTAGE of the many services available through J&L Warehouse Division's 13 strategically located Steel Service Centers.

Modern production methods and styling make increasing demands on sheet steel:

It shouldn't deviate in strength or finish—auto makers must double draw steel into sweeping curves and deep contours.

It shouldn't buckle—appliance, office equipment and furniture manufacturers want wide, strong planes that need no bracing.

It shouldn't wear, break or corrode—heavy equipment builders want tough steels that stand the bounce of heavy boulders and the grinding of abrasive gravel.

To provide the steels that meet these requirements, J&L invested nearly $800 million in new equipment and facilities.

These include a new 46-inch, high lift blooming mill—a new automatic oxygen scarfer—a new 80-inch four-high reversing rougher—a new horizontal scale breaker—a new cold reducing mill—a new cold shear line—new annealing furnaces—a new 56-inch temper mill—a new 44-inch hot strip mill.

The result? J&L sheet steels are remarkably ductile, strong, flat—sheet after sheet after sheet.

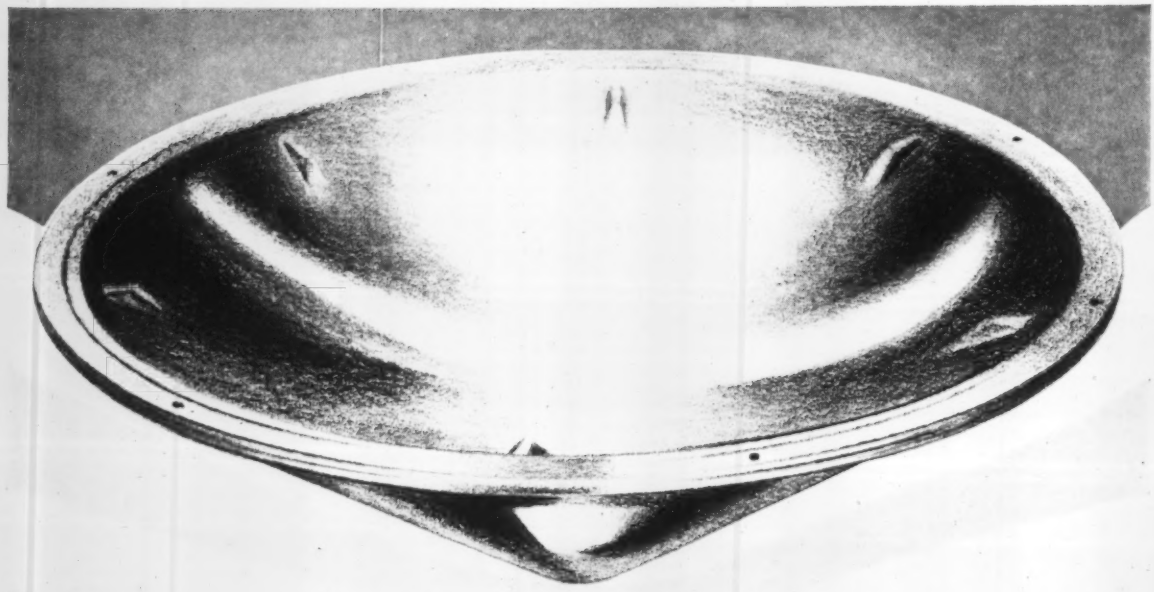
You can see why so many of the things you use and enjoy every day are made of J&L steel.

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

RCA WHIRLPOOL is a major user of consistent quality J&L sheet steel in these 24" washers produced in modern Clyde, Ohio, plant.

NOW BEING INTRODUCED by J&L, these colorful, plastic-clad steel containers are made of J&L zinc-coated sheets for patio, utility room or yard.



RE-ENTRY SHIELDS

EST. 1883

WYMAN-GORDON IS FORGING RE-ENTRY SHIELDS

- Copper in production
- Beryllium in limited production
- Reinforced plastics in development

WYMAN-GORDON

FORGING

ALUMINUM MAGNESIUM STEEL TITANIUM BERYLLIUM MOLYBDENUM COLUMBIUM
AND OTHER UNCOMMON MATERIALS

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS
DETROIT, MICHIGAN
GRAFTON, MASSACHUSETTS
FORT WORTH, TEXAS
FRANKLIN PARK, ILLINOIS
LOS ANGELES, CALIFORNIA

Technical Outlook

August 10, 1959

BETTER THREAD, BETTER BOLT—A new way to cut screw threads makes possible a high tensile bolt that withstands 2 million cycles at fatigue loads before failure. Outwardly, the bolts conform to present specifications, and no special techniques are needed for inspection. Maker: Elastic Stop Nut Corp. of America, Union, N. J.

PLASMA JETS ON MARKET—Flame spraying of ceramics and refractory metals at 12,000 to 15,000° F and research projects are expected to provide markets for a small plasma generator (it looks like a welding torch). The Research & Development Div., Avco Mfg. Corp., New York, makes it. The device is said to be inexpensive.

COMPUTER CHECKS TIN LINE—A new system at Inland Steel Co., Chicago, automatically accumulates, records, and prints quality errors in coils of tin plate. It uses sensing devices already on the line, says Airborne Instruments Laboratory, a division of Cutler-Hammer Inc., Mineola, N. Y.

IMPROVES COOLANT— A batch of a new coolant formula called Cold Stream has been running more than five months without deteriorating. The maker, S. C. Johnson & Son Inc., Racine, Wis., calls the fluid a significant advance in metalworking.

LIGHTER FASTENERS— A recently approved standard for the aircraft industry has cut weight of locknuts as much as 72 per cent compared with former requirements, indicates Standard Pressed Steel Co., Jenkintown, Pa. The lightweight locknuts have an unofficial part number: MS21042.

GM IMPROVES WELD CONTROL—A single meter connected to three pickups enables engineers to analyze resistance welding currents in the primary and secondary circuits of most resistance welding machines, declares Millard A. Ferguson, General Motors Process Development Staff, Detroit. An operator can determine quickly and simply the settings needed for a given job. Results claimed: Better quality, fewer rejects, and lower costs.

TRUER SHEET THICKNESS— A new chemical technique whacks variations in sheet thickness from plus or minus 0.003 in. down to less than 0.001 in., claims U. S. Chemical Milling Corp., Manhattan Beach, Calif. C. H. Lundquist, the firm's president, states that there is "no similarity between our new process, Chem-Tol, and chemical milling."

CAST DIES WITHSTAND 1600° F—Now forging dies can be cast to finished dimensions. A new process eliminates machining. One such die, made of Incoloy 713C, handled steel parts with exceptionally long, thin ribs, claims Armour Research Foundation, Chicago, which developed the method for the Air Materiel Command, U. S. Air Force.

SOUND AIDS STEELMAKING—Success with a pilot ultrasonic unit in removing smut from pickled steel sheets may lead to a full scale installation this year, predicts H. F. Osterman, sales manager, Branson Ultrasonic Corp., Stamford, Conn. Initial cost of a unit is about the same as that of a scrubber, he explains, but operating and maintenance costs of the ultrasonic equipment are said to be much lower.

BETTER METALS FROM FUNDAMENTALS— "We've gone nearly as far as we can with alloying and heat treating to produce stronger high temperature metals," thinks Dr. J. C. Fisher, Metallurgy & Ceramics Research Dept., General Electric Co., Schenectady, N. Y. "Our best hope is more fundamental knowledge of material behavior." An example: His highly regarded theory of dislocations which explains how metals fail under stress.

Metalworking Outlook—Page 69

Market Outlook—Page 161

FIBER METALLURGY:

NEW OPPORTUNITIES FOR METALWORKING?

Porous products can have high strength, temperature and corrosion resistance, and still be permeable. Composites of metals and ceramics with good strength, shock, and thermal properties are an exciting possibility

TECHNIQUES used in papermaking and powder metallurgy have been combined to spawn a new metalworking process. It's called fiber metallurgy.

Developed at Armour Research Foundation, Chicago, the process makes possible a new class of porous metal products that have high strength as well as permeability, and a new series of composite materials such as plastics, ceramics, or soft metals reinforced by fiber metal networks.

In fiber metallurgy, fibers of metal are felted as in papermaking and then sintered to form a weld bond at each point of contact between fibers.

• Dr. R. H. Read, supervisor of the metals department at Armour, envisions potential applications ranging from filters and battery plates to fragmentation armor and rocket nozzles.

The list of potential applications seems unlimited: Reinforced elastomers, low density structural materials, porous self-lubricating bearing materials, porous metal for aerodynamic application (boundary layer control) and transpiration cooling, reinforced friction materials (improved brake linings), metal flame barriers, gas mixers or diffusers, and many others.

It appears that any metal or alloy can be used for the process, although those which form stable oxide films (such as aluminum) are difficult to sinter. Included in the metals which Armour has felted and sintered are lead, copper, iron, nickel, and cobalt-base alloys; titanium; and molybdenum.

• Metal fibers used for the process range from 0.001 to 0.020 in. in diameter, and from 0.010 to 1 in. long.

Most work has been done with fibers prepared from metal wools, wires, filaments, or turnings. By chopping or milling, discrete fibers are made from those materials. The fibers, which may be all similar or random lengths, are then crimped or beat so they have random three dimensional kinks.

Felting makes the fibers into a uniform, randomly interlocked mass. A felt is formed by depositing the fibers from a slurry in a porous mold. The fluid is withdrawn from

the slurry through the mold.

The porosity of the felt is determined by the fiber length and other factors. It may be as great as 97 per cent.

The felts may be complex in shape, large in size, and can be in the form of continuous strip. They can be compacted by pressing in dies, rolling, extruding, and other operations, if further densification or shaping is required.

• Felts are sintered in a reducing atmosphere at temperatures high enough to obtain metal diffusion and metal bonding where fibers touch each other.

That critical step transforms the loose felt into a comparatively rigid, three dimensional, fiber network. Depending on the length to diameter ratio of the fibers and the density of the network, each fiber may be bonded at as many as 100 points to neighboring fibers.

Even though the bonds are not individually as strong as the fibers, the network is strong because of the many bonds.

Sintered metal fiber bodies can be further compacted, rolled, machined, welded, brazed, or treated in a variety of ways to fabricate finished, useful components having porosities of 5 to 97 per cent.

• Finished fiber metal products have unusual properties.

They may look and feel like metal sheets, but have less than 10 per cent density. Or they may have comparatively high density and high permeability so that gases or fluids flow through.

"No other method produces, by a single technique, a comparable range of densities for a metallic material," says Dr. Read.

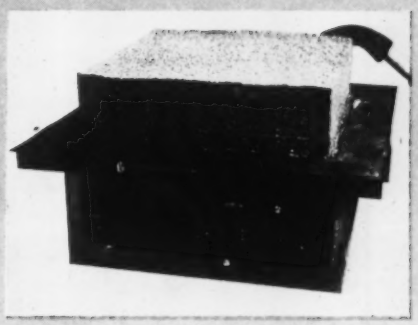
The fiber product has a continuous metal network; pores are continuous too. There are no blind pores as in porous powder metallurgy products. A metal powder body of 50 per cent porosity is difficult to prepare and will have poor mechanical properties, explains Dr. Read. The individual metal fibers, bonded at many points, are not so likely to become dislodged into the downstream side of a filter, he adds.

A new material for filter engineering is available in fiber metallurgy. At Armour laboratories, new filters for liquid metal systems have

Here's the Process . . .

1

Steel fibers in glycerin are placed in tower. Screen stops metal; glycerin is pulled off by vacuum

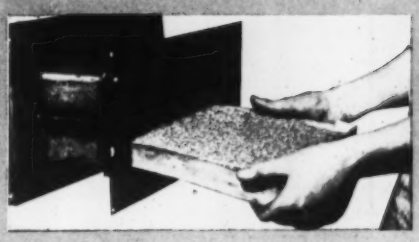


2

Felted metal after the slurrying operation. This is called a green felt. It has not been sintered

3

Felt is sintered in an enclosed muffle at 2450° F. Hydrogen is pumped into muffle, escapes through tube on cover



4

Sintered metal is Type 430 stainless steel. It looks like a metal sheet, but gases or liquids will flow through

been developed and utilized experimentally.

• The labyrinthlike structure of metal fiber materials suggests that they may effectively dissipate sonic and mechanical vibrations.

A good sound absorber which is also a good high temperature, corrosion resistant material could be of considerable value. Armour physicists examined some preliminary test specimens and found that they absorbed about 90 per cent of impinging sound energy, a value comparable to that of unbonded glass fibers.

Fiber metal materials also absorb mechanical vibrations. They can be useful as a structural material in mounting machinery or electronic components. Tests have shown that a stainless steel fiber sheet has an internal damping capacity six times greater than that of aluminum sheet of the same weight.

Porous fiber materials have large surface areas. They can be valuable for such applications as catalysts, separators, and battery plates.

For good automotive storage battery cells, a conducting network of lead which holds an active impregnant is required. Present cells contain a waffle shaped lead plate which carries the active material. A promising cell containing an impregnated lead fiber network has been built by Armour metallurgists. Conclusive evidence is lacking, but the new cells should be less prone to drop the active material. Such flaking off shortens cell life.

• Metal fiber networks make possible an entirely new family of composites.

Those materials often satisfy the demands of special applications where no single homogeneous material is satisfactory. The pores of fiber networks can be completely filled with a second material, such as plastic, to form continuous, interpenetrating networks of materials.

Metal fiber-reinforced plastics may have better impact strength, fatigue strength, and wear resistance than glass fiber-reinforced materials. The metal product also is able to conduct heat and electricity.

The auto industry is experimenting with metal fiber-reinforced plastic, making sheet metal forming dies for short run operations. Wear resistance and strength are good. An added benefit is gained in curing of large plastic bodies by transmission of the heat from the interior sections.

• Some plastics (such as Teflon) are good gasket materials, but are not rigid enough for many applications. Metal fiber reinforcement can increase their strength and make them more useful.

Armour scientists are trying to determine if lead can be reinforced by strong metal fibers without loss of resistance to chemical attack or loss of nuclear shielding properties.

Magnesium metal reinforced with steel fiber does not have superior strength-to-weight ratio, but has improved elastic modulus and impact strength. When the modulus is measured by the frequency response or dynamic method for the composites, multiple answers are obtained. A frequency response peak may occur for each of the continuous components and another results from the characteristics of the total composite.

The reinforced magnesium is being considered as a lightweight fragmentation armor because of the modulus and impact properties.

• Metal fiber-reinforced ceramics constitute one of the most exciting new possibilities of fiber metallurgy.

The use of a uniform, fine metal skeleton in a refractory ceramic can improve strength, shock resistance, and thermal properties. Strength improvement can be likened to that produced by reinforcing concrete with steel bars. It is possible that materials analogous to prestressed, reinforced concrete can be developed for even higher strength. Thermal and shock property improvements should result because of the continuity of the metal reinforcement.

One problem of the metal-ceramic composite is the difficulty of fabrication. Armour is studying the details of fabrication and expects to come up shortly with new materials for testing.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service STEEL, *Penton Bldg., Cleveland 13, Ohio.*

Numerical Control Cuts Milling Costs

Machine commands, calculated from process information and stored on tape by a digital computer, make for faster work and eliminate errors by human operators. Tooling costs are lower, and surface finish is improved

YOU CAN machine intricate parts to extremely close tolerances at high production rates, with a minimum of tooling leadtime. Numerically controlled tools may give you the results you are looking for.

Tooling costs, machining time, and leadtime are brought to a new low in making thrust bulkheads for Atlas ICBM missiles at H&B American Machine Co. Inc., Indianapolis. Profile and pocket milling are done on the bulkheads with a numerically controlled, three axis machine. The control system was supplied by the Industrial Controls Section, Bendix Aviation Corp., Detroit.

• Parts are made faster and more accurately than with conventional machinery.

Machine productivity is increased; tooling costs are reduced; and surface finish of the parts is better than that produced by other methods. Error by human operators is eliminated.

The bulkhead is machined from a 3 in., rough sawed, aluminum plate, from the Ft. Worth, Tex., plant of Convair Div., General Dynamics Corp. Before machining, the plate weighs about 500 lb; the finished part weighs 49 lb.

The machine produces the outside contour of the parts. It also does pocket milling on the front and back. Metal is removed by climb milling, with a spindle speed of 1800 rpm and a feed of 30 in. per minute.

Web thickness of the finished part is 0.071 to 0.131 in. Flange and stiffener thickness is 0.100 to 0.375 in. Webs and stiffeners are held within 0.010 in. of specified thickness; tolerance on some flange areas, where mating assemblies are attached, is 0.005 in.

• Dimensional information is organized on a process sheet, then transferred to punched cards. It's finally coded on a numerical control tape.

All necessary machining information, such as cutter size, feed rate, and sequence of cuts, is recorded on a process sheet, in the right order for processing by a digital computer.

The company's process planners take advantage of automatic milling routines for the machining of 51 pockets on the bulkhead. That requires a minimum of information. Final dimensions, number of rough passes required, clearance plane, and cutter diameter are sufficient. The computer calculates a tool path for all machining needed in the pocket and records the information on a machine control tape.

• The company doesn't have a tape preparation system. Tapes are made by Bendix at Detroit.

All information on the handwritten process sheet is recorded on punched cards with a standard key punch machine at the tape preparation center. Cards are checked for accuracy. Handwritten information is typed on a verifier; as each key is punched, the verifier checks the code on the card and detects any errors. A new card, with corrected information, is then prepared.

A digital computer interprets data on the cards, calculates cutter centers, and interpolates curved sections, providing intermediate points that will define a continuous path. It resolves the specified feed rate into required speeds for individual machine slides. It translates decimal input into binary code, arranges results in the right format, and produces a tape that's compatible with the control unit on the milling machine.

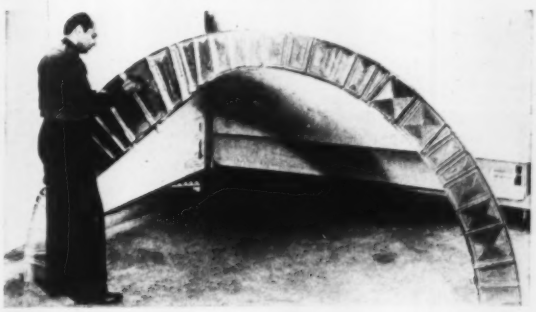
• Milling with numerical control requires a minimum of manual setup.

The control tape is mounted on a photoelectric reader in the machine control unit. Spindle speed and cutter locations are selected manually, and the tape controlled machining cycle is started.

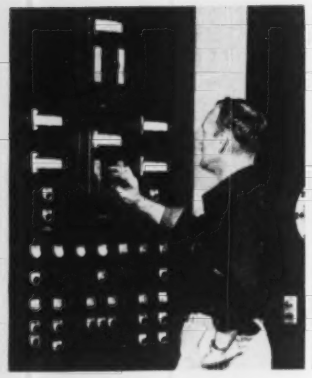
The control unit reads information from the tape, and guides the machine through all motions needed to mill the bulkhead. When the part is finished, the cutter is withdrawn automatically.

Summary of Savings:

	Numerical Control	Previous Method
Machining time	60 hr	135 hr
Tooling cost	$5800	$9500
Leadtime	40 days	60 days



Missile bulkhead is made from rough sawed aluminum plate by a numerically controlled profile machine.



Automatic Control Made Easy

(For Guys Who Hate Slide Rules)

IF YOU'RE NOT one of those erudite chaps classified as instrument engineers, you've probably had occasion to wonder about their language.

Here's what we mean. The other day we asked one of our engineers this simple question: What kinds of control can you get from industrial instruments?

Without even batting an eye, he reeled off: Floating, interrupted floating, proportional, proportional-plus-reset, and proportional-plus-reset-plus-rate.

That tipped us off to what we were getting into, but, throwing caution to the winds, we asked him to elucidate. He quickly smothered us in an avalanche of terms like "controlled variable," "deviation of a predetermined amount from the set point," "process reaction time," "dead zone," "transfer lag," and too many others to mention.

Surely, we figured, there must be some way for a man to get at least a hazy idea of this science without having to take courses in mathematics, thermodynamics, and instrument terminology. Here's our attempt, which we'll pass on to you for what it's worth.

First, let's forget about the electronic and mechanical complexities of control instruments, such as millivoltmeters and potentiometers, and think in terms of a man acting as a control instrument.

We'll take this human controller and have him do a number of different operations. The operations are analogous to the equipment or processes a control instrument might handle.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, Ohio.*

Floating Control

Imagine you're a tightrope walker. The object is to stay on the wire until you reach the other side. As you drift left or right, you use the pole as a counterbalance. In principle, controls that keep temperature in a heat treating furnace in right zone operate the same way.

Interrupted Floating Control

Try it on one foot now. It's harder because you must account for a time lag. The counterbalance doesn't take effect immediately. It means you'll have to correct, wait, then correct some more. Controls must do the same job in keeping temperature in a large heat treating furnace in the right zone.

Proportional Control

You're riding a unicycle across a wire that's level. The idea is to maintain constant speed from one end to the other—which isn't as easy as it sounds because your legs will get tired. Substitute heat loss in a heat treating furnace for fatigue, and you can see how this type control works. It calls for that needed extra oomph.

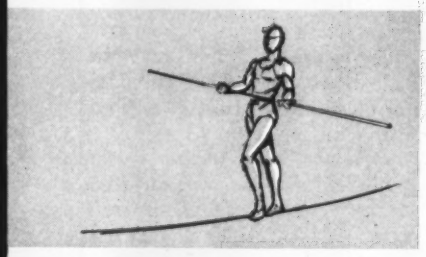
Proportional-Plus-Reset Control

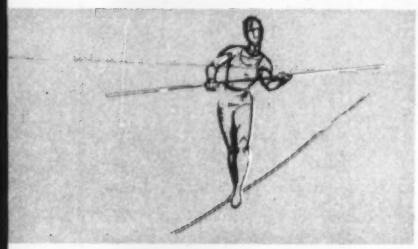
When you add what amounts to a hill, the problem of maintaining a constant speed gets rougher. It means that you must put more muscle into your efforts. This type control on a heat treating furnace goes into action when there is a change in load—as charging 10,000 lb billets in furnace that's handling 5000 lb billets.

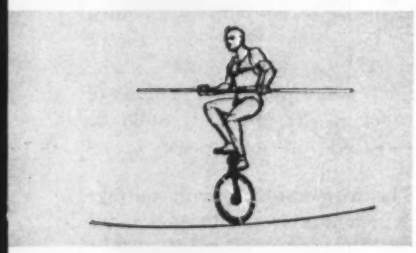
Proportional-Plus-Reset-Plus-Rate Control

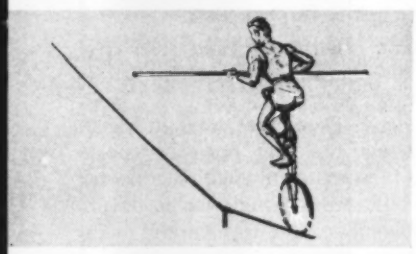
A new problem is added to the preceding one: Reach standard speed on incline as soon as possible. Here's where your friend (labeled reset) gets a workout. Because there is a tendency to exceed the specified speed at first, further corrections are necessary. Controls handle such jobs when a batch process is started up.

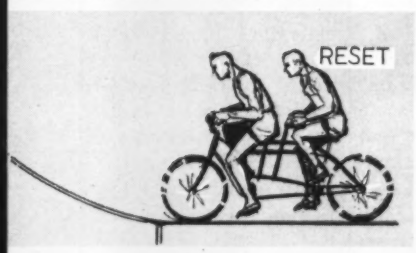
By E. A. MURPHY JR.
Assistant Manager
Market Extension Div.
Minneapolis-Honeywell
Regulator Co.
Philadelphia

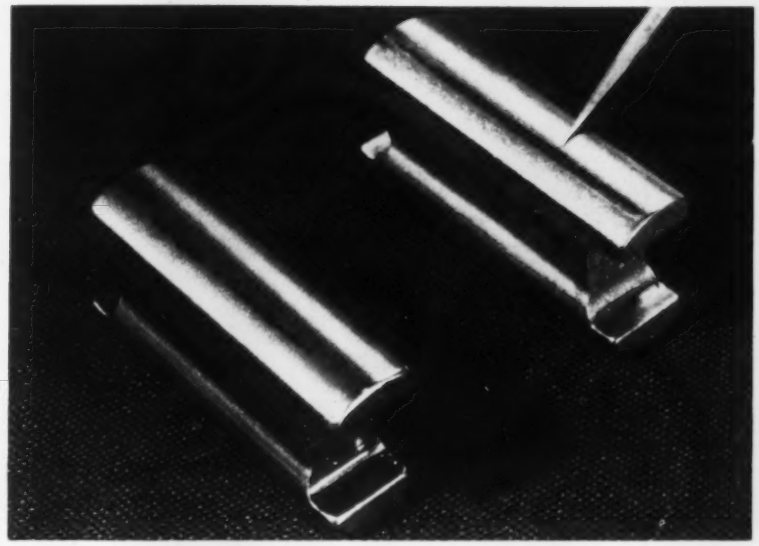












Chromized sprag (left) shows less wear than a standard steel part. The sprags were taken from the same overrunning clutch after severe endurance tests

Diffusion Alloyed Parts Increase Clutch Life

WEAR resistance of some small mechanical parts is extremely important. For example, slight changes in the shape of the sprags in an overrunning clutch can mean the difference between good performance or failure.

Steel sprags are Chromized (diffusion alloyed with chromium over their entire surface) at Formsprag Co., Warren, Mich. They last up to three times as long as previous parts, says Roger L. Daniels, chief engineer. The company developed the process with the Chromalloy Corp., White Plains, N. Y.

• The Formsprag clutch consists of concentric races, with shaped sprags between them.

Rotation of the driving race wedges the sprags, transmitting torque. Sprags are kept in contact with both races by coil springs.

Clutch sprags used in torque converters are subjected to extreme wear, and had to be replaced often before the new process was adopted.

• Chromizing isn't a plating process. Chromium is alloyed with base metal, forming chromium-carbide.

Parts are packed with a powder containing chromium in a sealed retort and subjected to a time and temperature cycle similar to that used in pack carburizing.

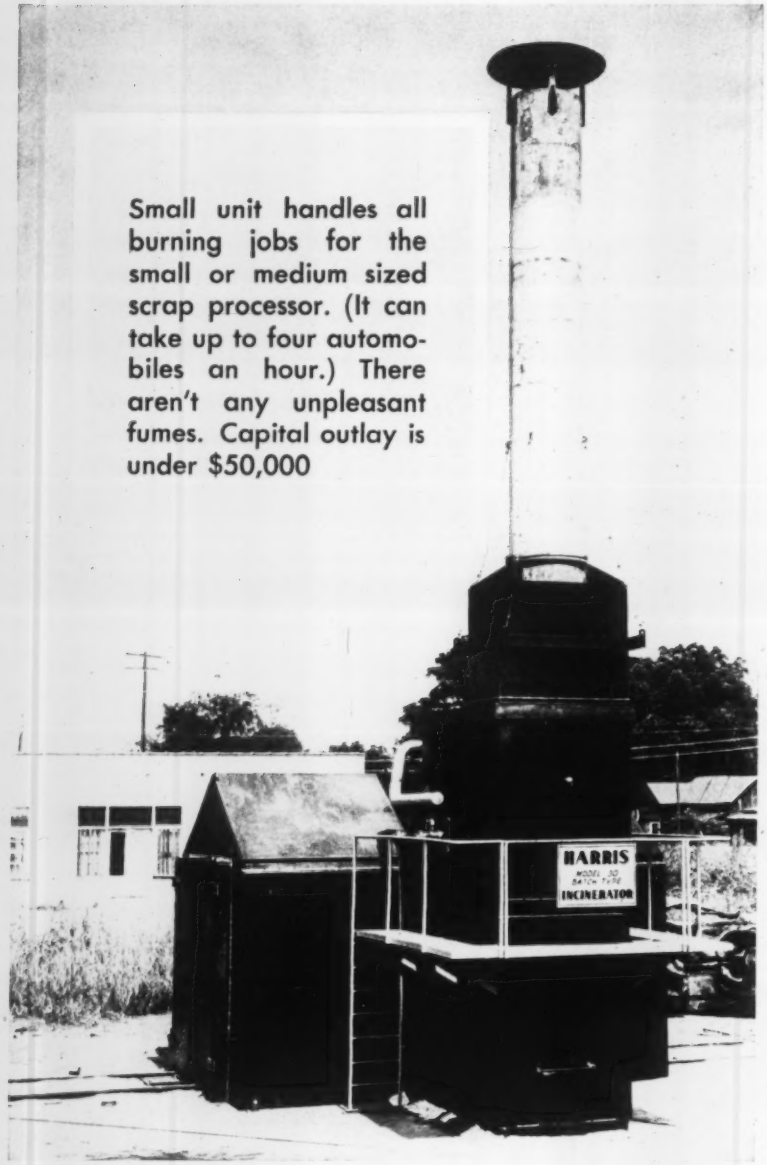
Chromium is diffused into the base metal, forming a chromium-carbide alloy. Cores of the parts are annealed in the process. Heat treating gives the cores a hardness of 61 to 63 Rockwell C, to match surface hardness of about 80.

• Diffusion alloyed sprags have shown superiority over parts used previously.

In a field test, 25 clutches using Chromized sprags were returned to the factory for evaluation after being used 1½ years. The sprags showed less wear than previously used parts.

In one test, Chromized sprags were removed from an automobile transmission that had run 55,000 miles and compared with sprags from another transmission that had run 33,000 miles. The alloyed sprags showed less than half as much wear as the other parts.

Incinerator Solves Air Pullution Problem



Small unit handles all burning jobs for the small or medium sized scrap processor. (It can take up to four automobiles an hour.) There aren't any unpleasant fumes. Capital outlay is under $50,000

SMALL and medium sized scrap processors can now dispose of combustible materials in automobiles or other salvage items with equipment engineered to their operations and solve their air pollution problems.

The batch loaded, afterburner type incinerator was developed by Harris Foundry & Machine Co., Cordele, Ga. It processes four automobiles an hour.

The problem: In some areas, smoke, soot, and gases produced when salvage materials are burned must be eliminated. But scrap processors have to burn out all combustible materials before they can sell scrap.

One solution: The afterburner principle offers complete combustion and a short burning cycle. It has been approved in several large cities. Smoke, consisting of unburned particles and some ash or dust, is eliminated. Combustibles are heated above ignition temperature and burned. Dust and ashes settle out because of the low gas velocity.

A damper controls the volume of smoke entering the afterburner. The rate of smoke combustion is regulated by the firing rate of the burners and the flue opening.

• Auto bodies or other materials are carried in and out of the incinerator on small rail cars. The unit is fired with fuel oil.

Automobiles, with engine blocks and wheels removed, are loaded on small rail cars. Two of the rail cars are used; they're linked together, so one can be unloaded and reloaded while the other is in the kiln.

The autos can be burned one at a time, but the incinerator is more efficient when two autos are processed at once.

Material to be burned is doused with fuel, doors are closed, fuel is ignited, and the damper is opened. It takes 20 to 25 minutes to burn all combustible materials, except tires, on two automobiles.

The unit uses 30 to 40 gallons of #2 fuel oil per hour. It could be modified to burn natural gas.

• The incinerator is built to take high temperatures. Objectionable fumes are confined until they're burned.

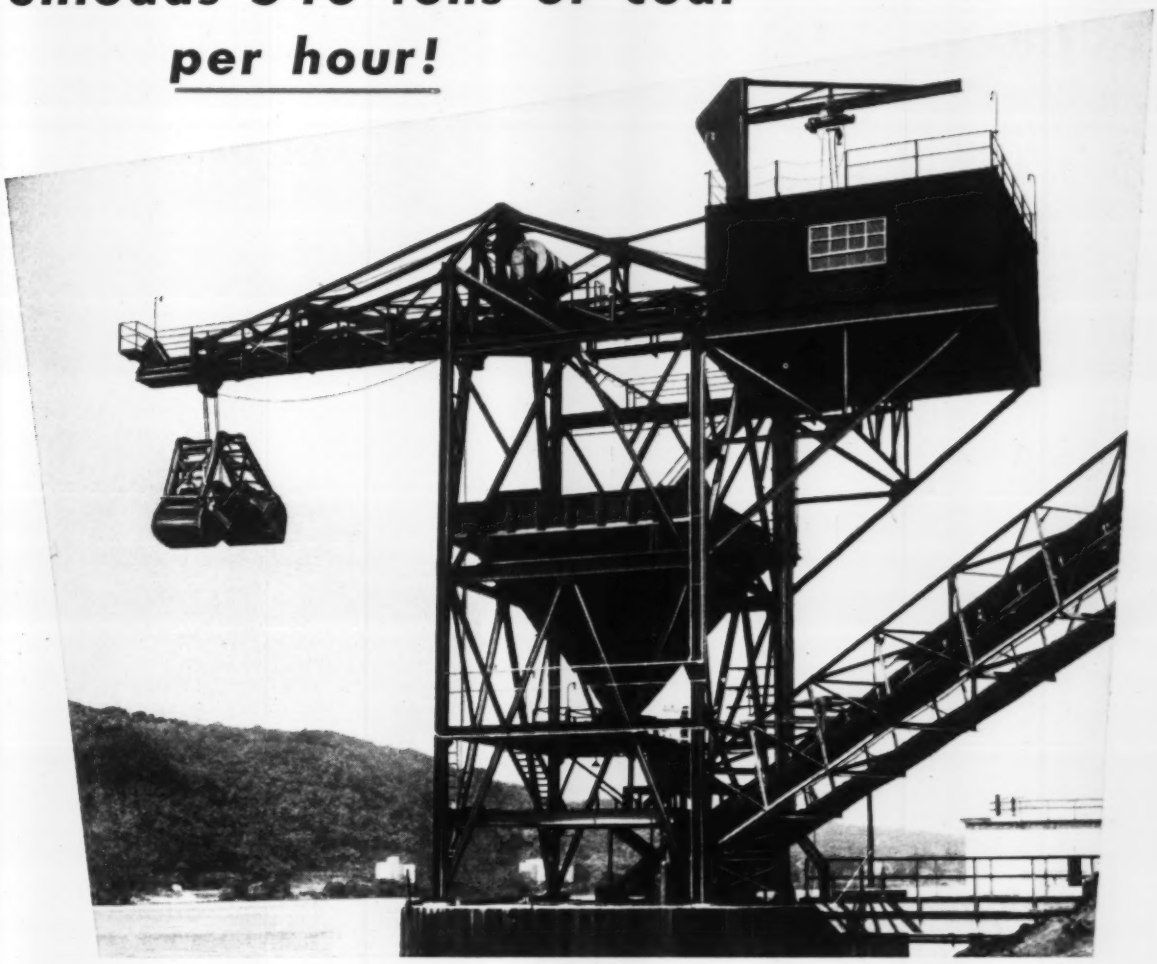
Kiln, afterburner, and stack are made of corrosion resistant alloy plates, structural channels, and angles. Doors are wedge fitted; asbestos gasketing prevents smoke from escaping through the doors.

Rail cars are built for loads up to 5 tons. They're equipped with ball bearing wheels.

The incinerator, priced below $50,000, measures 20 by 24 ft, and can be installed in a 20 by 50 ft area. That allows room for loading the rail cars and for opening or closing the doors of the kiln.

The company plans to offer larger capacity units in the near future, says R. C. Harris, president.

BROWNHOIST TOWER
unloads 540 tons of coal per hour!



Designed and built to unload coal from barges to a power plant on the Ohio River, this Industrial Brownhoist stationary tower crane achieves a production rate of 540 tons per hour! Barge hauls move barges to proper location underneath unloader and coal is transferred to 100 ton bin built into the tower and then fed on to a belt conveyor to the plant. All motions are controlled by operator from one position in operator's house which is pressurized with clean air provided by a blower.

The tower, with a 6-ton rope system, is fixed to a concrete cell and is of all-welded construction. Erection joints are fastened with high strength bolts. A pillar crane is fixed to the tower to service electrical and machinery parts in the machinery house.

Industrial Brownhoist designs and builds specialized equipment like this tower in any tonnage and capacity for handling any material at sea ports, steel mills, ore and coal docks and railroad yards throughout the world. For more information on reliable high speed, high capacity material handling equipment, write for catalog 562.

209

BROWNHOIST

CLAMSHELL BUCKET

250 TON WRECKING CRANE

COAL ORE BRIDGE

CAR DUMPER

LOCOMOTIVE CRANE

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: Cleveland, Philadelphia, Chicago, San Francisco, Montreal.

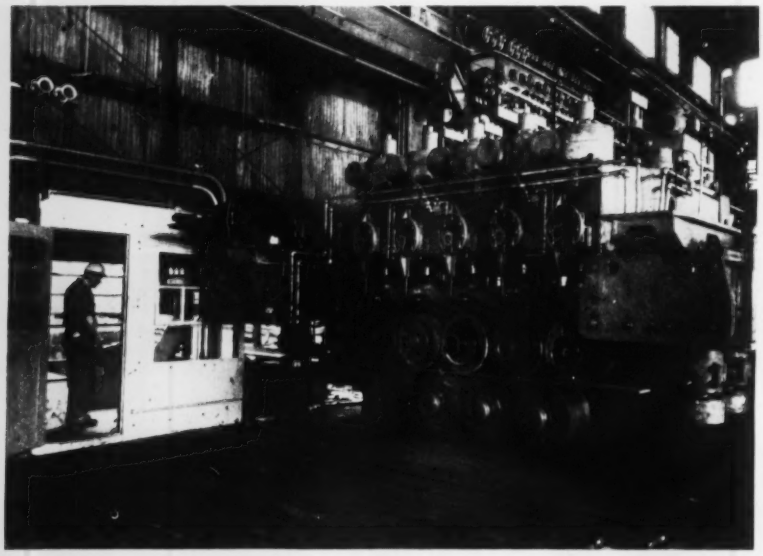
• **AGENCIES:** Detroit, Birmingham, Houston

Revamped Mill Boosts Specialty Output

Bethlehem Steel Co. overhauled rolling facilities at Steelton, Pa., to meet increased product demand and closer specifications. A new heating furnace doubled bloom output. A 28 in. breakdown mill, with card controlled screwdowns, rolls larger sections than previous equipment. A new roller straightener improves product quality

Punched card control makes the new, 28 in., breakdown mill easier to operate. Roll opening is set automatically for as many as 30 passes

Material is visible all the way through this overhung type roller straightener. Machine is faster, turns out flatter products than previous equipment



MODERN equipment and more efficient mill operation have doubled capacity of the Specialty Products Dept. at the Steelton, Pa., plant of Bethlehem Steel Co.

The plant turns out a variety of steel parts for hard service, including tractor shoes, scraper blade cutting edges, and mine roof supports.

• New mill equipment includes a bloom heating furnace, and a 28 in., reversing, breakdown stand that's operated by card control.

A three zone, oil fired, bloom heating furnace replaced two older units. That boosted bloom capacity from 35 to 70 tons per hour. Closed circuit television permits the pusher operator to see inside the furnace at the discharge end.

A two high, card controlled, reversing breakdown stand permits larger sections to be rolled. It breaks down blooms in a few standard sizes for rolling in the company's 20 in. mill. It increases tonnage by eliminating some passes in the smaller mill.

The breakdown stand also improves surface quality of products made from scarfed blooms, providing light passes and frequent turning before shaping passes are made.

The mill has an extremely wide window opening (43 in.). That permits use of high collar rolls for shaping passes.

Screwdowns, as well as the discharge table on the reversing stand, are operated by the punched card systems.

Other operations can be added to the system if desired.

• Replacement or modification of old components gives the 20 in. mill greater capacity and flexibility.

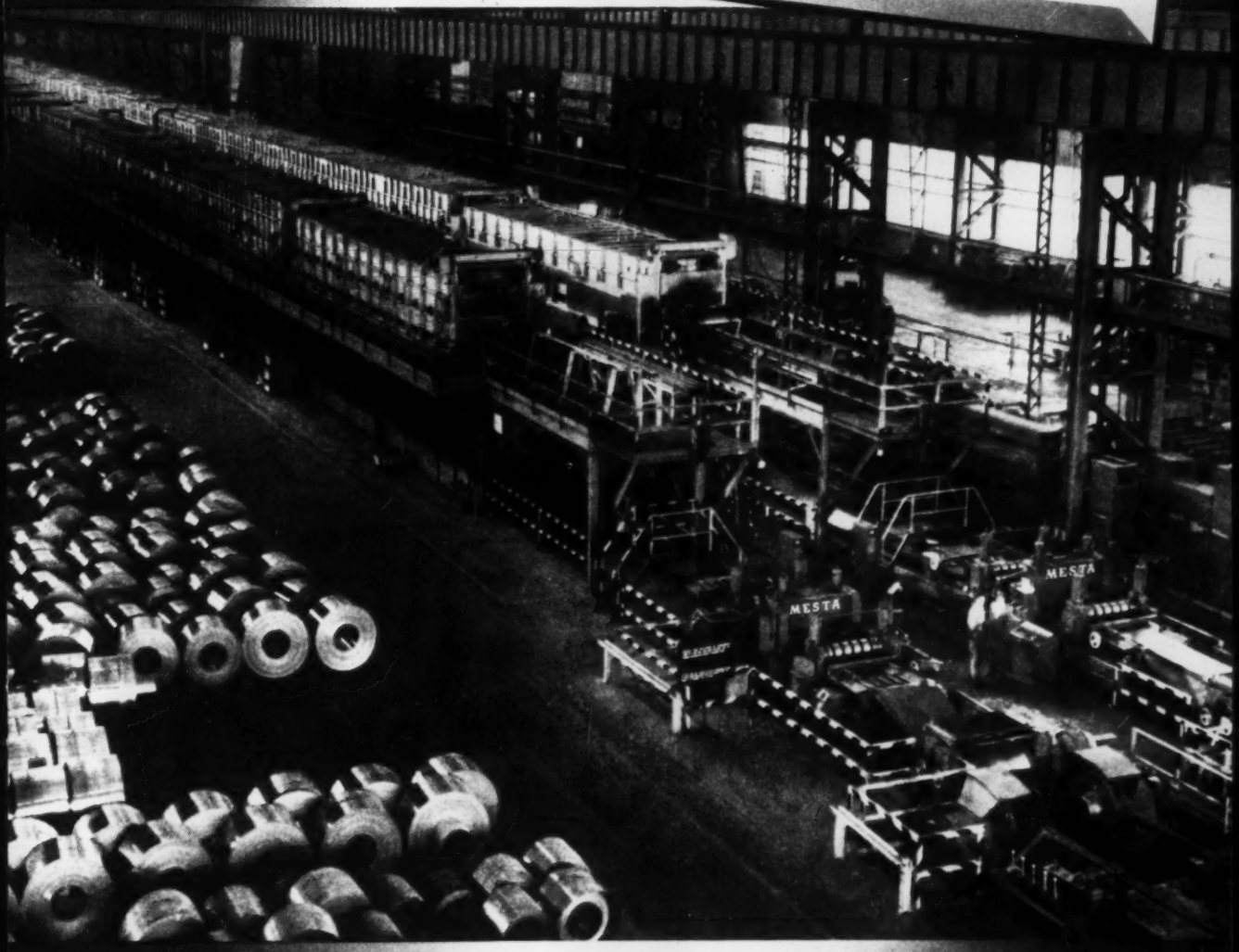
One of the three high stands of the old 20 in., three stand rolling mill was replaced with a two high leader stand and a two high finishing stand.

Also installed: An overhung type roller straightener and a shear equipped with hydraulic clamps to give it greater accuracy.

Continuous

GALVANIZING LINES

Designed and Built by MESTA



Two MESTA 48" Continuous Galvanizing Lines
with Feed Reels, Straighteners and Mash Welders

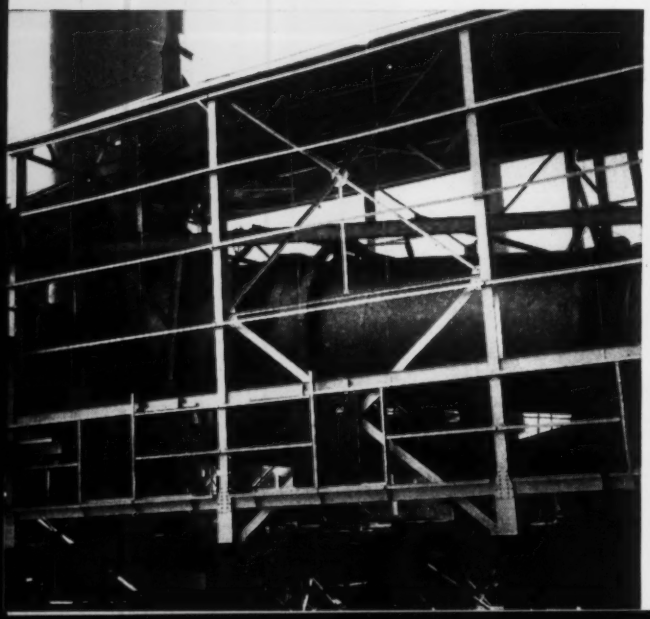
Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

GREAT LAKES

This balling drum is the biggest ever used—50 feet long and 12 feet in diameter. It has an adjustable-speed motor and the slope is controlled by shims. This superior method of preparation is delivering 600 tons of permeable sinter mix material per hour.



The straight-line, forced-draft cooler is 10 feet wide and 178½ feet long over the windboxes. It is cooling hot sinter at the rate of 480 tons per hour. A 50-hp motor drives the cooler strand at about 11 feet per minute.

STEEL SETS INDUSTRY RECORD

8,400 tons of sinter per day in new plant built by KOPPERS

Operation of the sintering plant and materials handling systems is controlled from this panel board, located at the feed end of the sintering machine. It's the largest iron ore sintering machine in the world.

It's the largest iron ore sintering machine in the world —12 feet wide and 200 feet long over 19 double windboxes. It's a giant, but operates with a very high efficiency. Total output of 8,400 tons from *one* machine in a single day is a new record for sintering.

This plant is part of the continuing expansion program at the Zug Island Works of Great Lakes Steel, a Division of National Steel Corporation. The company foresees a hot metal production increase of 20 to 30%, due largely to the sintering and ore handling facilities designed and built by Koppers Company, in cooperation with engineering and operating personnel from National Steel.

The new facilities include an ore handling system, an ore crushing and screening station, a miscellaneous materials handling system, a sintering plant, and a sinter handling system. The installation has 84 conveyors, with widths up to 48 inches and capacities to 1,250 tons per hour.

Many of the features in this installation are entirely new to commercial plant operation. You might be interested in the complete story, which is covered in an 18-page booklet, "Ore Handling and Beneficiation at Great Lakes Steel." For a free copy, please write to Koppers Company, Inc., Engineering and Construction Division, Room 1124, Pittsburgh 19, Pa.

KOPPERS®

KOPPERS

ENGINEERING AND CONSTRUCTION

Special Machine Builder Sets Sights on World Market

Plant in Germany will help Cross Co. trim costs and market machines in foreign countries. One goal: A two way trade of components between the plants

"IT'S the only way I know to become truly competitive in the world market," is the way Ralph Cross, executive vice president, Cross Co., Detroit, explains his company's move to build a plant in Germany.

"We intend to protect and improve our competitive position in the rapidly growing market places of Europe, South America, Australia, India, and the Far East."

• **Dollar Advantages**—The 50,000 sq ft plant will be built near Stuttgart. Cross executives expect it to be turning out special machine tools in about a year.

One of the prime reasons for the move, explains Mr. Cross, is the excellent opportunity it represents for maximum return to stockholders. "Coupled with highly favorable operating costs, equipment depreciation, and other tax benefits, mushrooming markets in European and other foreign countries provide a timely opportunity for the company."

Another advantage: The design, manufacture, and sale of special machines often require close co-ordination between the seller and the buyer. "It will be a competitive advantage to have someone from Cross within easy reach of the customer, and that man will know the customer's problems and his approaches to production."

That geographical advantage, plus the potential of being able to build a machine for 25 to 40 per cent less than it can be built here, will help Cross compete against a foreign special machine industry that has been growing steadily since about 1954.

• **Two Way Street**—Mr. Cross told a Senate Banking & Currency Subcommittee on International Finance that he also hoped to develop two way trade between his American and European plants.

"By importing items that can be made more cheaply in Europe and exporting services best supplied from here, the company will have a competitive edge in both domestic and foreign markets," he says.

Speculating on this interplant exchange, Mr. Cross told STEEL he reasons that machine components in which there is a high labor content will be more economical to build abroad. But certain items available in the U. S. (like some bearings or electrical control elements) are not available abroad. Those components could be assembled into machine units in the Detroit plant, then exported.

This expansion follows the company's entry into the nuclear and electronics fields through a new subsidiary, Cross-Malaker Laboratories Inc., Mountainside, N. J. "Part of the role of the laboratories," explains Mr. Cross, "will be to provide new products that we can make in our Detroit and German plants."

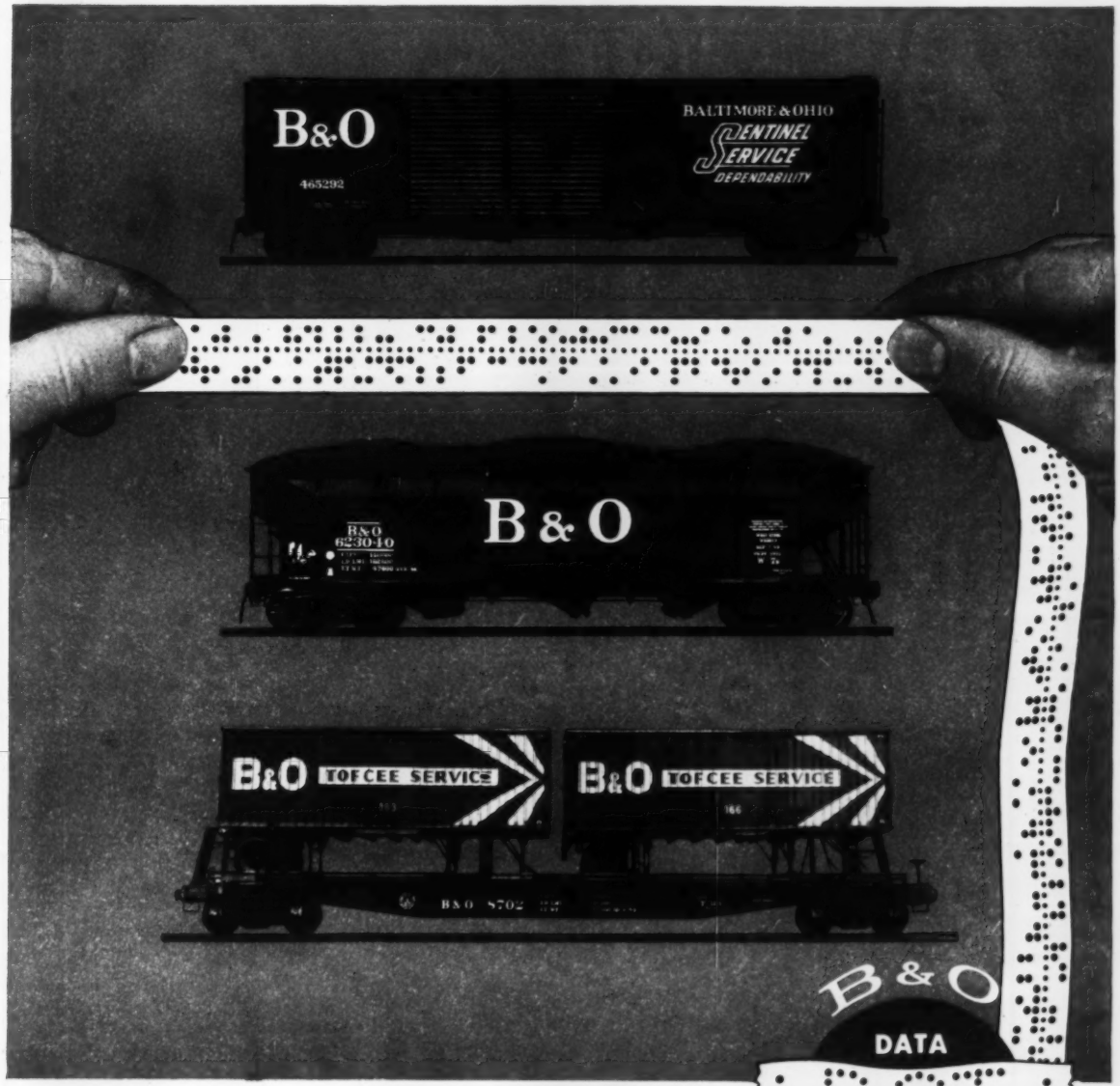
Cross Co. executives spot the location for their new German plant. From left to right: Milton O. Cross Jr., president; Ralph Cross, executive vice president; and A. A. Vetter, recently appointed manager of overseas operations for the company

Inflation's Toll

If you're bothered by the continually increasing cost of doing business, here's a machine tool story that may point up why.

A company in Pittsburgh bought a big boring mill in 1918 for $48,000 and had it in continuous operation until this year. It recently decided to put it up for sale. A heavy machinery dealer forked over $60,000 for it, making the original investor look like a genius.

As soon as the dealer had title to the machine, he put it on the market. It sold for $125,000.



Shippers get an extra "measure of service" with B&O . . . DOT . . .

It's a new performance measure of electronic railroading! . . . DOT . . . picks up car movement information *progressively* from 29 key B&O yards . . . sorts and transmits it to B&O System headquarters 24 hours a day.

. . . DOT's . . . continuous, speedy flow of car information lets 58 B&O traffic offices know where carloads are at all times . . . and it covers all commodities. You'll get extra shipping satisfaction from . . . DOT . . . ! Ask our man!

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BALTIMORE & OHIO RAILROAD

The Line of SENTINEL Service • TIME SAVER Service • TOFCEE Service

Automatic Gaging Is a Must On Many Short Run Jobs

Where precision is required, tedious hand checking and sampling are on the way out. The trend puts automation on an economical footing in this area

AUTOMATION is usually associated with mass production, but one of the most significant applications today (automated gaging) is in short lot production.

• **Two Reasons**—Control methods are often at fault when part quality or product reliability are below standard. This is especially true on short-run production checked manually.

Further, the increased decentralization of manufacturing and the upswing in automatic assembly demand better control over production results.

W. Fay Aller, vice president, Sheffield Corp., Dayton, Ohio, says: "Unit inspection costs have ceased to be the major consideration in an increasing number of cases. Protection of quality is." Such thinking has put automatic gaging squarely in the short run business.

Many of Sheffield's customers are upgrading their inspection methods. Small lots, say a few hundred parts a day, or even a week, formerly checked manually are being inspected on semiautomatic or automatic gaging machines.

• **Flexibility Is a Must**—Next to accuracy and reliability, gaging capacity is most important on short runs. Sheffield says that to get a maximum return on your investment you need a gage that can handle different sized parts and configurations. Another advantage: You will also eliminate the problem of gage obsolescence.

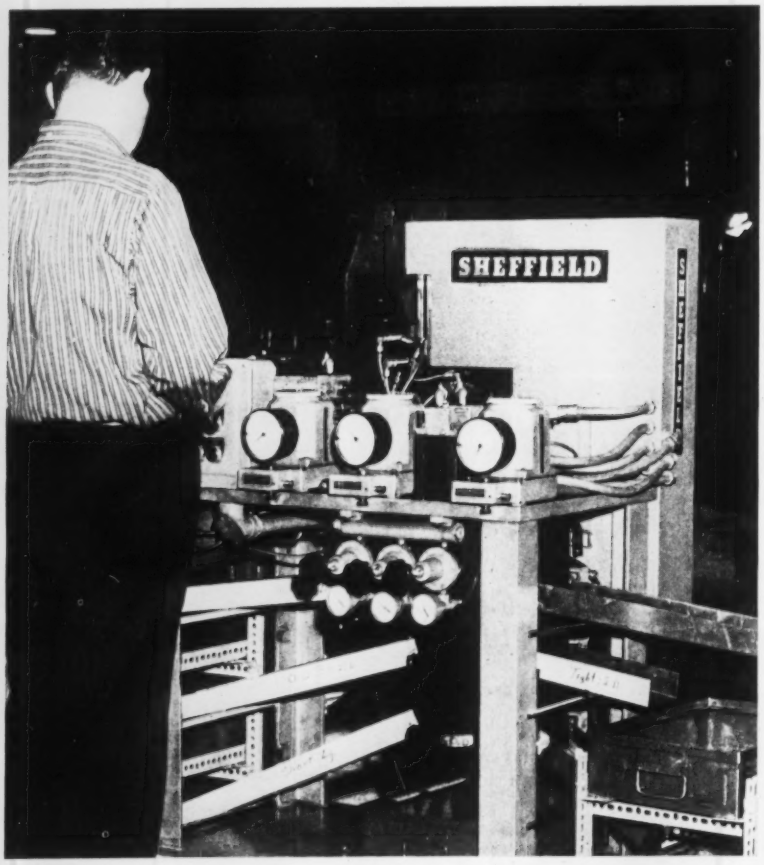
For example, the machine shown here gages bushing type parts within the range of $\frac{7}{8}$ to $3\frac{1}{2}$ in. OD and $\frac{5}{8}$ to $2\frac{3}{4}$ in. wide. It automatically classifies parts into seven groups: Acceptable, oversize or undersize on outside diameter, oversize or undersize on inside diameter, and oversize or undersize on width.

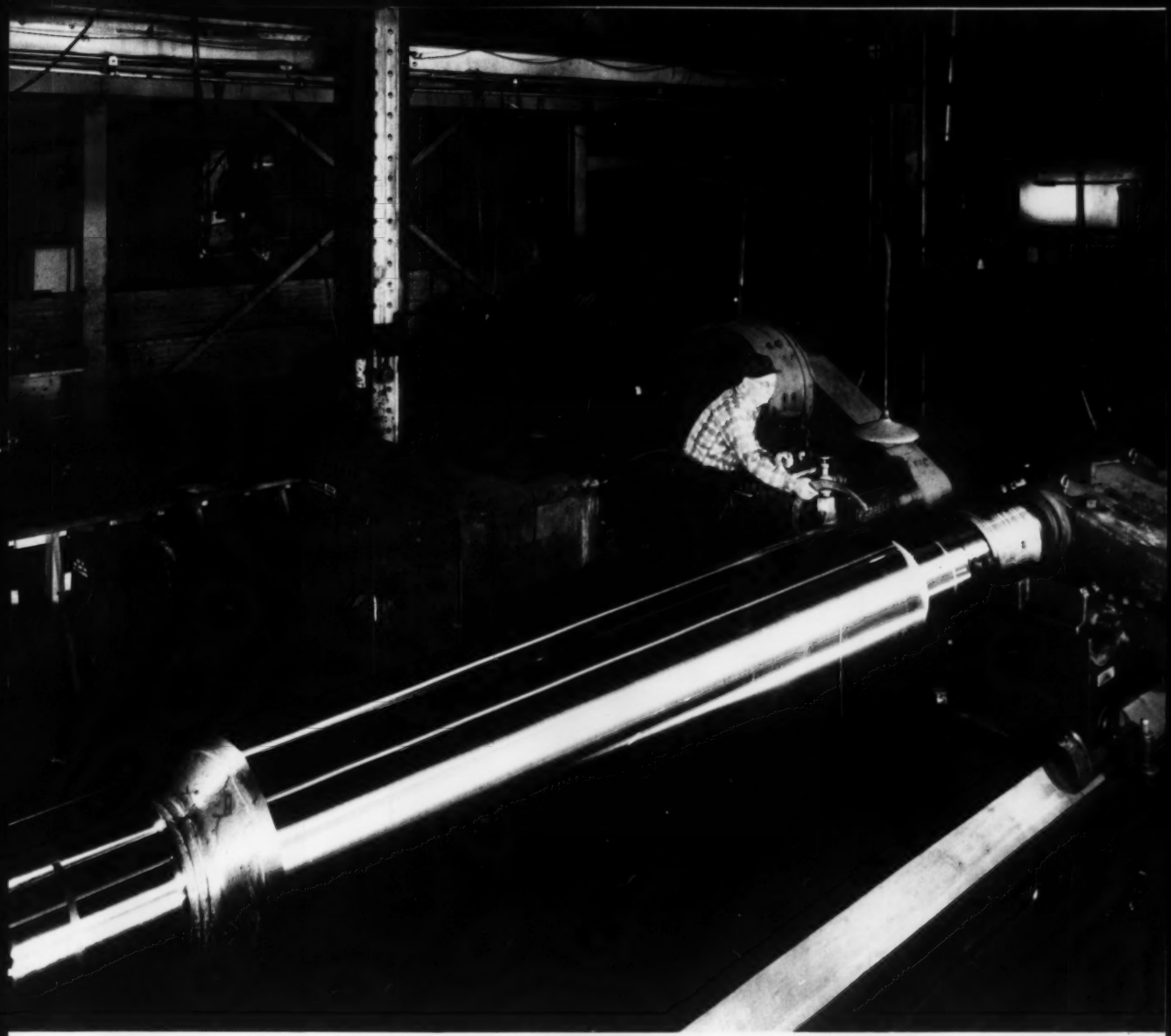
At the Roller Bearing Co. of America, West Trenton, N. J., the machine gages as many as 12 different part sizes during an 8 hour shift. Since every part turned out is gaged, the inspection record is a measure of the performance of the automatic bar machines that produce them. And 100 per cent inspection, instead of sampling, precludes the possibility of wasting heat treating and grinding on faulty parts.

• **Dollar Reasons** — Suppose you have a short run job where precision is important and hand inspection, spotchecking, and sampling don't do the job. How do you justify an automatic machine? Normal equipment decisions are based on the price of the machine, measured by the number of units to be inspected and the time required to write off the investment.

Sheffield engineers say that their customers often find that they have no choice but to go automatic when they also figure the costs of inadequate gaging, resultant poor quality, part failures, and dissatisfied customers.

Although this gage inspects as many as 12 different types of parts in an 8 hour shift, it incorporates mass production features like automatic cycling and segregating. Part of the economy comes from quick-change tooling that keeps downtime to a minimum



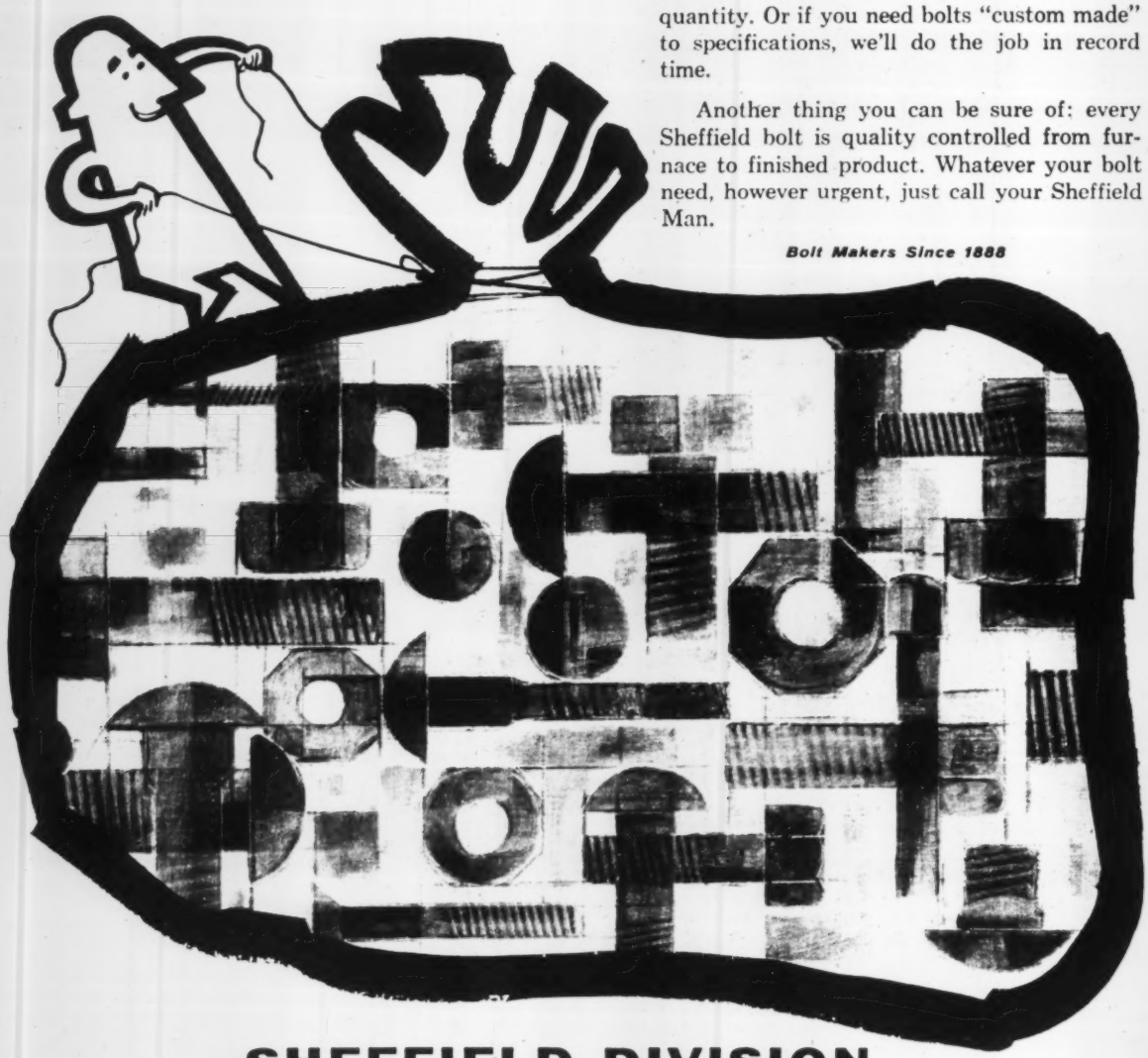


NEXT STOP: Stand No. 6, finishing train

The glossy finish of this 35,800-pound Mack-Hemp Nironite F double-poured alloy iron work roll will soon be transferring itself to the quality hot rolled strip turned out by the 132-inch semi-continuous mill of Geneva Works of U. S. Steel Corporation's Columbia-Geneva Division, near Provo, Utah. This roll...like every one produced at Mack-Hemp...has been "custom-tailored" for the mill in which it is to serve. Tailored by Mack-Hemp's skilled foundrymen and roll turners at every step of the way through pattern making, alloying, pouring, machining and grinding. This, backed by the Mack-Hemp tradition of progressive metallurgy that is constantly developing new and better roll analyses, is why *you get more tonnage from the rolls with the striped red wabblers.*

MACKINTOSH-HEMPHILL • Division of E. W. BLISS COMPANY
Pittsburgh and Midland, Pa.

Need a REALLY BIG selection of bolts?



First step is to pick a really big boltmaker. Sheffield's Bolt and Forged Products Department is one of the world's largest integrated bolt plants. That means wide selection. Big productive capacity. Fast service.

You get immediate shipment on thousands of different standard and special bolts. In any quantity. Or if you need bolts "custom made" to specifications, we'll do the job in record time.

Another thing you can be sure of: every Sheffield bolt is quality controlled from furnace to finished product. Whatever your bolt need, however urgent, just call your Sheffield Man.

Bolt Makers Since 1888

SHEFFIELD DIVISION

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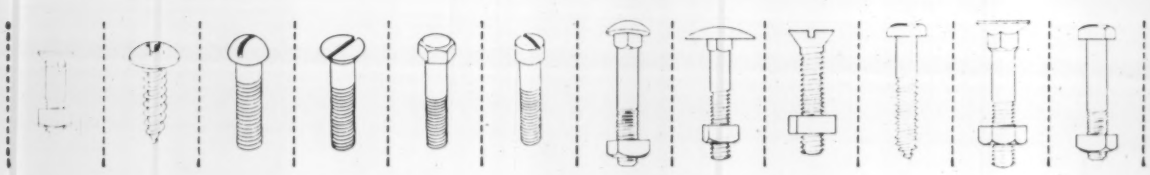
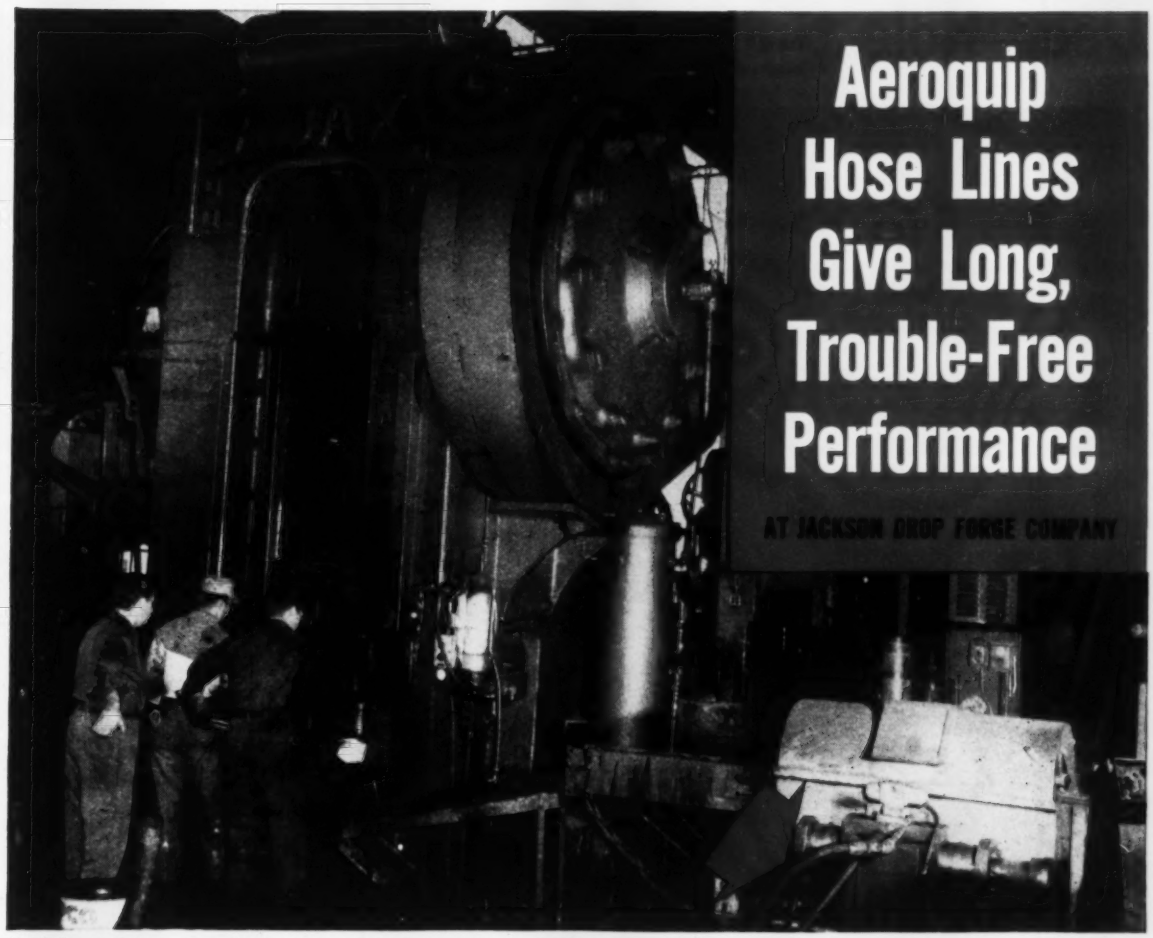
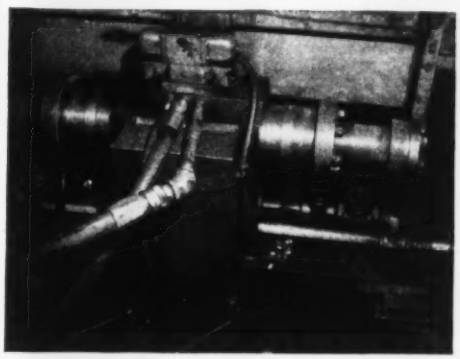


Aeroquip Hose Lines Give Long, Trouble-Free Performance

AT JACKSON DROP FORGE COMPANY



Hot billets withdrawn from the furnace pass through the water descaler at the right before forging. Arrow points to Aeroquip Hose Lines.



Aeroquip 1509 High Pressure Hose Lines on the billet descaler are subject to hydraulic pressures up to 2,500 psi.

Rugged Aeroquip 1509 Hose Lines in Good Condition After 2½ Years on Billet Descaling Unit

Use of high quality Aeroquip Flexible Hose Lines assure full service life of fluid lines on all types of metal-working equipment.

At Jackson Drop Forge Company, Jackson, Michigan, Aeroquip 1509 Hose Lines have performed well on the high pressure hydraulic systems used on special billet descalers. These hose lines withstand pressure surges, heat, oil soaking and vibration. They are in good condition after 2½ years' service.

Whatever your fluid system requirements, you can depend on your Aeroquip Distributor to provide replacement hose lines that will do the job. Call him today; he's listed in your Yellow Page Phone Directory.

Aeroquip

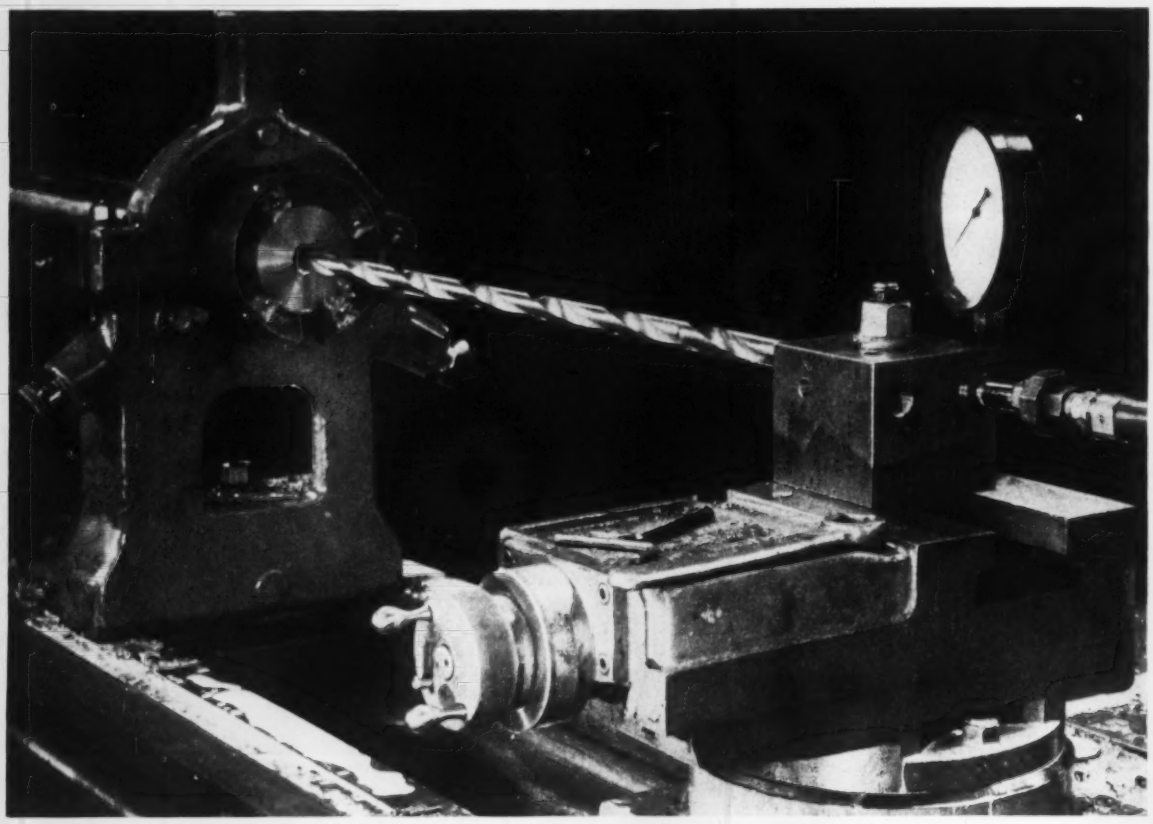
REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Deep Hole Drilling Method Saves Time



Drill is locked in a special toolholder that rides on the lathe cross slide. Lubricant enters the hollow core of the drill through the hose on the back of the toolholder. The workpiece rotates in a steady rest on the lathe bed

Hollow core drill, mounted on a lathe cross slide with a special toolholder, is fed into a rotating workpiece to produce an air hole 69 in. deep. Drilling time on one gearshaft is 2.3 hours, vs. 6.79 by the old method

HERE'S an idea if you're drilling deep holes in hard steel.

A hollow core drill, held in a lathe with a special toolholder, cut machining time more than 65 per cent on one operation at Shartle Div., Black-Clawson Co., Hamilton, Ohio. The company designed its toolholder. It uses drills supplied by Mossberg Inc., Hamilton, Ohio.

• The method was developed to drill air holes in gearshafts. The workpiece is rotated, and the drill is held stationary in a toolholder.

The hole is 69 in. deep and ¾ in. in diameter. It's started by drilling a pilot hole 3 in. deep, with a conventional, carbide tipped twist drill, held in the tailstock of the lathe.

The tailstock is then backed away, and the toolholder, mounted on the lathe cross slide, is aligned with the workpiece. (A drill rod is inserted in the toolholder for alignment.)

The hollow core drill is positioned in the toolholder, and the gearshaft is rotated at 895 rpm. The drill penetrates the work at 2.327 in. per minute. The shaft is drilled from one end, then from the other.

Soluble coolant is pumped through the drill at 210 psi line pressure.

• Drilling time is reduced with new techniques and tooling.

A hole is drilled by the new method in 2.3 hours. That allows for removal of the drill from the work when the hole is finished and about 15 minutes lost time.

The drill doesn't have to be retracted for chip removal. Small chips generated by the drill are washed away in the coolant. The carbide insert in the drill tip showed

only slight wear after drilling a distance of 280 in. in hard steel.

Formerly, it took 6.79 hours to drill one hole, allowing 0.05 hour per inch of penetration up to 30 in., and 0.11 hour per inch beyond 30 in. The drill had to be withdrawn periodically for chip removal.

• Improvement of the machine and method may save still more production time.

The company feels it can reduce drilling time further by developing a better drill holder and by centralizing controls. Better tool rests may permit higher spindle speeds and faster penetration.

Cost of Assembly, Upkeep Cut by Wire Thread Insert

A re-usable wire thread insert that's self-locking has reduced assembly and maintenance costs of a paint pump made by Nordson Corp., Amherst, Ohio. The stainless steel inserts are used in 16 tapped holes in aluminum at critical assembly points.

• Benefits—They reduced weight, simplified design, prevented boss thread stripping and wear, and eliminated the need for supplementary locking parts. The inserts (made by Heli-Coil Corp., Danbury, Conn.) also protect the tapped holes against wear and corrosion.

All connections in the pump are kept from loosening under vibration by a grip coil near the center of the insert. This locking coil approximates a polygon instead of being circular, the shape of the other coils of the insert. When the bolt is run through the insert, the grip coil maintains a strong, springlike pressure on the bolt, giving a locking effect which is not impaired through repeated assembly and disassembly. The bolt may be readily removed by applying breakaway torque which is about equal to assembly torque.

The inserts are made from 18-8 stainless steel wire (AMS 7245). Ultimate tensile strength is about 200,000 psi. The part conforms with all applicable military specifications. Screw-Lock units are painted red to distinguish them from regular Heli-Coil inserts which don't have the locking feature.

All-Purpose Cutting Oils Improve Machine Accuracy

Replacement of eight lubricants with two trim production costs by reducing inventories. Tools last longer; scrap losses are fewer; and machining time is cut 25 per cent

YOU CAN increase efficiency in your plant by making machines and materials serve more than one purpose.

Two all-purpose cutting oils replaced eight lubricants at the R. W. Cramer Co. Inc., Centerbrook, Conn. The oils, supplied by Gulf Oil Corp., Pittsburgh, improved accuracy and reduced machining time 25 per cent on some parts, says W. J. Perzanoski, foreman, Screw Machine Dept.

• The two lubricants were chosen because they had all properties needed for the wide range of machining operations at the company.

Simplification of the company's cutting oil inventory was suggested by B. F. Kimball, sales engineer for Gulf. He recommended two grades of Gulfcut: 31A for brass and cold rolled steel and 41C for bronze and stainless steel.

Tools last longer and scrap losses are less with the new oils. And smaller lubricant inventories mean lower production costs.

• Closer tolerances can be met without slowing down the machines.

Often the company meets tolerances of 0.0005 in. on stainless steel parts, using automatic or hand screw machines. All-purpose lubricants permit the work to be done at normal machine speeds.

In a typical operation, pinion posts ½ in. long are machined from AISI Type 303 stainless steel. Outside diameters must be smooth and concentric; all dimensions must be within 0.001 in. of their specified value. Six lengths and four diameters are specified on each part.

Screw machines using all-purpose cutting oils make these pinion posts to closer tolerances. Each part requires 25 seconds of machining time

FASTER . . . CLEANER . . . MORE ECONOMICAL WHEN YOU PAINT WITH THE RANSBURG

Electrostatic Hand Gun

Gator Boat transport trailers are painted in less than half the time—with half the paint—with the new Ransburg Electrostatic Hand Gun.

For instance

Peterson Bros., Inc., Jacksonville, Florida and Ft. Wayne, Indiana, world's largest manufacturer of boat trailers for the Marine Industry, switched from air hand spray to Ransburg No. 2 Process Electrostatic Hand Gun at the Fort Wayne operation in the finishing of their big custom line boat trailers and their Gator line of Marine Trades Equipment.

Paint saving with the Ransburg Hand Gun is estimated at 50 to 60% over the former method. Construction of their products (they use a lot of tubular steel) is ideal for Hand Gun application because of the "wrap-around" characteristic of Electro-Spray.

Painting is done now in an open spray room where two water-wash booths stand idle. Not needed! Maintenance in the paint room has been reduced 75%, for where they used to have to clean up the room sometimes twice a week (mostly on overtime) it now goes two or three weeks without cleanup.

One of Peterson's biggest products now painted electrostatically is a boat transport trailer, Model 807, built to haul six 16-ft. runabout boats. The trailers are over 31-feet long; overall height is 11'-2" and almost 8' wide. With air spray, it used to take 8 hours, or more, to paint the big vehicles. Now, with Ransburg No. 2 Process Electrostatic Hand Gun, one operator does the job in only 3½ hours. And, with half the paint!

NO REASON WHY YOU CAN'T DO IT, TOO!

Write for information and literature about this revolutionary, new painting tool. See how the Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. If your production justifies conveyorized painting, it'll pay you to investigate Ransburg's automatic electrostatic spray painting equipment. Write for our No. 2 Process brochure which shows numerous examples of modern production painting in both large and small plants.

RANSBURG

RANSBURG
Electro-Coating Corp.
Box-23122, Indianapolis 23, Indiana

Heat Resistant Alloy Rolls Stand Up in Furnace Duty

High temperature alloy rolls have been in almost constant service in a slab heating furnace for more than three years at Westinghouse Electric Corp.'s Metals Plant, Blairsville, Pa., withstanding 2150° F without replacement. The 10 in. diameter rolls were designed by Westinghouse and Blaw-Knox Co., Pittsburgh, utilizing Blaw-Knox alloy 22H.

• **Alloy Properties**—The chrome-nickel-iron material has high strength at elevated temperatures, resistance to oxidation, and ability to maintain its shape under load. The rolls were cast at National Alloy Div. of Blaw-Knox, Blawnox, Pa.

Westinghouse is conducting a pilot operation at Blairsville to test new ideas and perform materials developmental work under production conditions. It was created in 1955 to develop new metallurgical materials and processes, with emphasis on wrought special alloys and molded metal products.

Forged slabs are rolled on a 24 in. hot mill. Zirconium, titanium, and various Westinghouse alloys (such as Kovar, Hipernik, Hipernom, Refractaloy, and other chrome-nickel-molybdenum alloys) are processed.

The slabs are forged from ingots cast from induction melted metals. They weigh up to 1000 lb.

• **Furnace**—The air-gas fired, continuous roller hearth unit (it's 43 ft long and 28 in. wide) can be operated at 70 to 200 fpm. During heating, the slab is cycled back and forth through four heat zones.

Gas capacity is 3720 cubic feet per hour. At 1050 Btu per cubic foot, that's 3,906,000 Btu per hour.

Offers Tougher Tubing

Welded steel tubing made for use in heat exchangers is announced by Babcock & Wilcox Co., New York. Called Lectrosonic, it's formed from steel strip; edges are joined by electric resistance welding.

After five years of field tests, company officials say it's as good or better than other heat exchanger tubing, and costs 10 to 32 per cent less.

Cutoff Saw Slices Steel Without Clamping

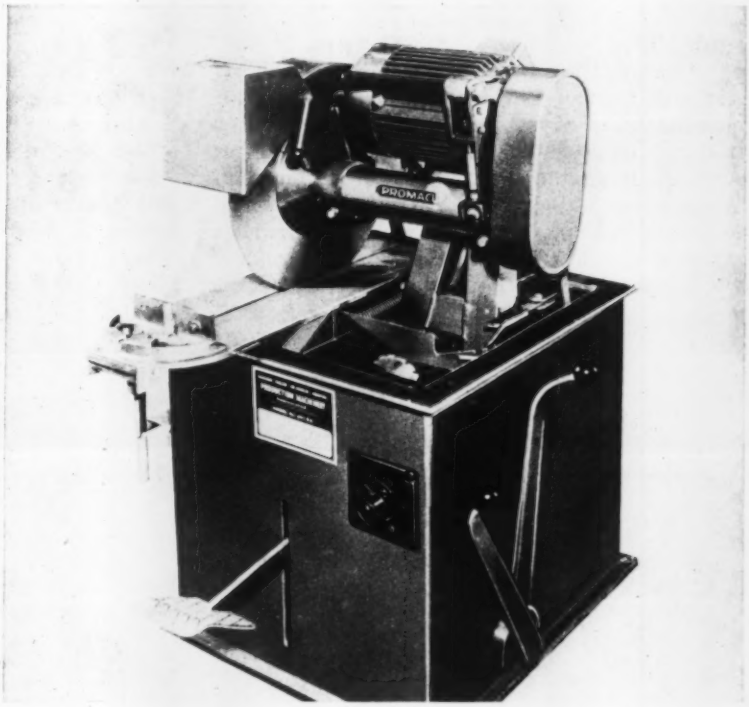
HIGH SPEED cutting of carbon, alloy, and stainless steel shapes with the Promacut unit requires no clamp down or coolants. A special alloy saw blade and cutting angle do the job. They produce a semi-milling operation instead of a scraping or abrasive action. The result is a smooth, practically burrfree cut without drag.

The blade cuts quickly and prevents stock temper changes due to absorbed heat. No coolants are necessary. Cuts are made with the stock lying on the cutting table.

The unit has a single cut capacity to handle 4 x 4 x ½ in. angles, 12 in. (20.7 lb per foot) channels, 6 in. (12.5 lb per foot) I beams, 1⅝ in. diameter bars, and 12 x ½ in. plates. Larger pieces can be cut by a second pass.

The wheel head is counterbalanced for hand or foot operation.

For more information, *write* Production Machinery Inc., Box 322, Oakton Station, Des Plaines, Ill.



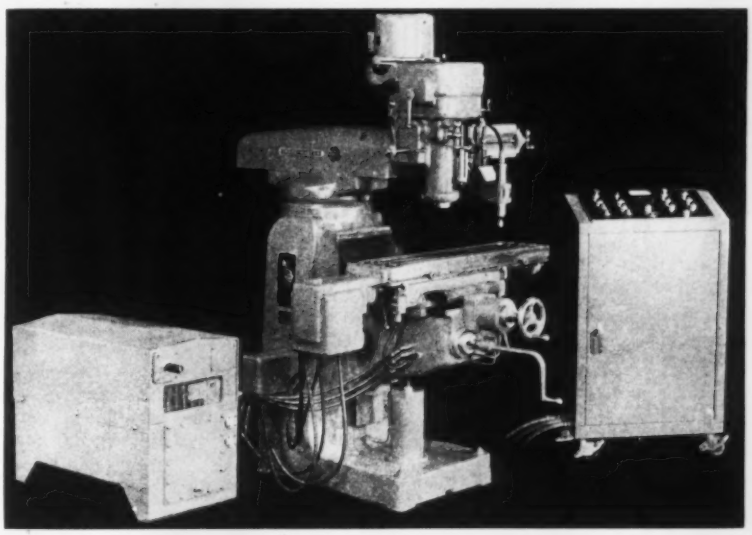
Duplicator Uses Electronic Tracing, Hydraulic Feeds

THIS AUTOMATED machine can mill convex and concave shapes at high feed rates and close tolerances. It can also be used as a conventional power or hand feed milling machine, utilizing the full length of table and saddle screws.

An electrohydraulic tracer control is combined with a standard Gorton milling machine for continuous scanning in three directions —all automatic within the cutting cycle. Hydraulic feeds are used.

The small, cartridge-type tracer head allows maximum visibility and permits easy access into deep cavities. No heat is generated within the tracer head. Tracing stylus pressure is about 8 ounces and permits the

(*Please turn to Page* 150)



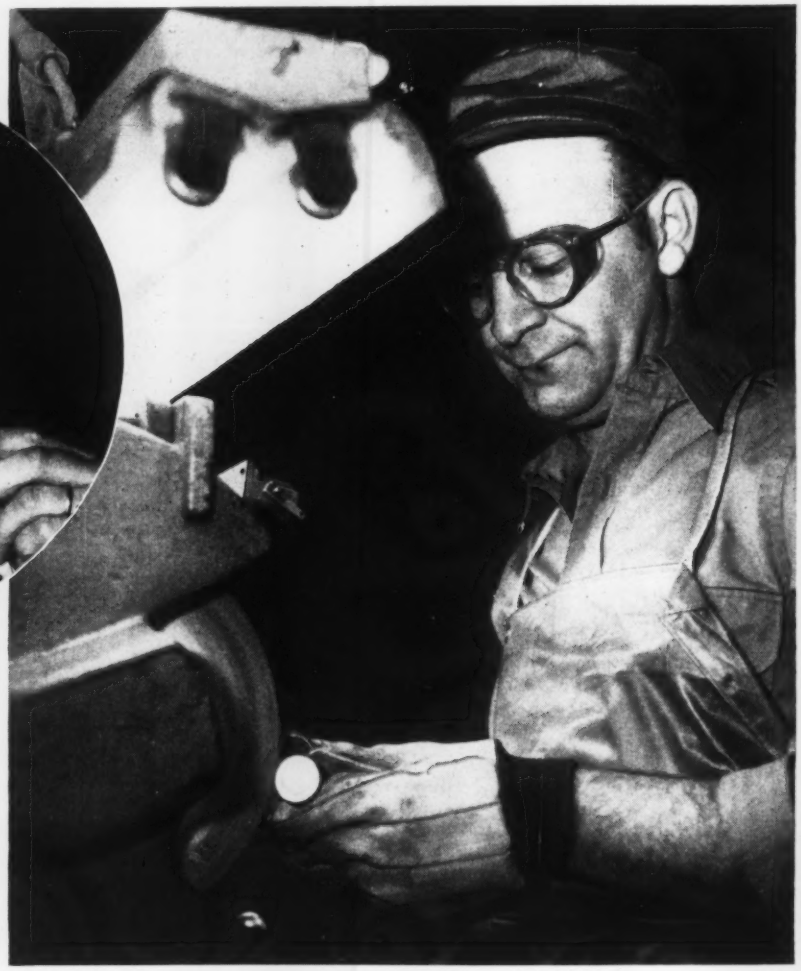
Allen Hughes cut abrasive costs 18 to 1 at

Grinding the gripper-die marks off a jet turbine blade can be an expensive business. At the Harrisburg Works of Thompson Ramo Wooldridge, these super-alloy steel blades used to be semi-finished with coated abrasive belts until Industrial and Abrasive Control Engineer Paul Mazich started checking up on costs.

Mazich called in Bay State Abrasive Engineer Allen B. Hughes and he dug into the problem. Working with Bay State distributor General Machinery & Equipment Company, Hughes made a series of careful tests. The result was a grinding wheel that cut the annual cost of abrasive materials alone from $18,000 to $1,000. Its unique combination of special bond and abrasive grit increased cutting spread, prevented loading and eliminated the need for dressing so successfully that productivity rose, labor costs dropped and there were additional savings of around $5,000.

Like Allen Hughes, the Bay State Abrasive Engineer in your area is a trained expert. He backs up the work of the experienced men who represent Bay State's topflight distributors and Bay State's research labs back them both with new ideas, techniques and materials. *Better grinding at lower cost . . . that is our business.*

Industrial Engineer Paul Mazich examines finish on jet engine blade forging after off-hand grinding operation illustrated at right.



Operator E. S. Jones semi-finishes jet turbine blade in off-hand grinding operation with cool-cutting, self-dressing Bay State grinding wheel.

Thompson Ramo Wooldridge

Allen B. Hughes worked up through Bay State's Westboro plant and then added extensive field experience so that his knowledge of abrasive problems and practical solutions for them covers every phase of abrasive engineering.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh, Los Angeles. *Distributors:* All principal cities.

(*Continued from Page 147*)

use of many types of soft masters.

For more information, *write* George Gorton Machine Co., Racine, Wis.

Narrow Aisle Fork Truck Can Boost Storage Capacity

YOU MAY be able to increase storage capacity as much as 50 per cent by using the Towmotor Naro-Aisle-Stack which can transport heavy loads and stack them at a 90 degree angle in 6 ft aisles.

The unit is equipped with hydraulically operated outriggers. It

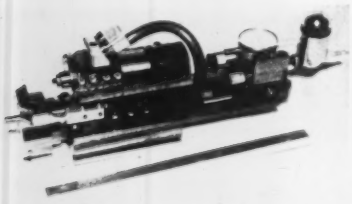
can do right or left angle stacking, lift loads at 70 fpm, and maneuver safely through congested warehouse areas.

For more information, *write* Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio.

Pneumatic Face Miller

ACCURATE facing or milling operations can be done in any position with the Luft Line face milling unit. Mounting is simple.

A variety of jobs such as boss



milling, face milling, counterboring, and others can be handled speedily and economically. The unit is particularly adaptable to large assemblies that have an area 3 to 5 in. in diameter to be milled or faced.

This unit enables taking the machine to the work. The necessity of tieing up large, expensive milling machines can be eliminated.

For more information, *write* Automation Tools Inc., Box 331, La Jolla, Calif.

Seals Agitator Shafts

MECHANIPAK seals will prevent agitator shaft leakage at pressures up to 3000 psi and withstand temperatures in excess of 700° F, even in corrosive environment.

Available in sizes to fit any shaft, the seals are completely self-contained in a single unit for simple, quick installation.

For more information, *write* Garlock Packing Co., 437 Main St., Palmyra, N. Y.

Plastic Process Solves Steel Coating Problems

UP TO 30 per cent savings over other products and methods are claimed for an easy handling, spray-on vinyl formula which binds securely to the base material for the life of the product.

Coatings of 0.003 to 0.012 in. when used over pretextured steel will accurately retain the detail of the textured pattern. The coating will resist abrasion and wear.

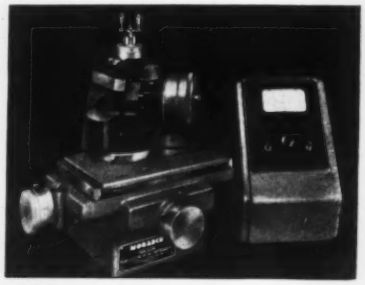
It can be applied over prefabricated assemblies, leaving no open edges or unsightly weld burns. It may be applied only to the finished assembly or part, avoiding expensive, contaminated scrap loss.

For more information, *write* Kaybar Inc., Birmingham, Mich.

Unit Measures Radiuses Of Lathe Cutting Tools

THE MONARCH precision radius checking instrument is an aid in the superaccurate machining of such things as hemispherically shaped workpieces.

It consists of a main frame, a



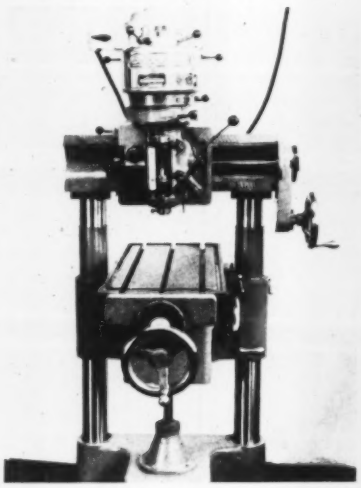
means for holding and positioning the measuring head, and a means for mounting and adjusting the tool. The instrument may be equipped for the recording of tool contours on a direct reading oscillograph. An electronic checking device is also required (it's not supplied by Monarch).

For more information, *write* Monarch Machine Tool Co., Sidney, Ohio.

Mill Does Precision Work

HERE is a V-mill built for precise work. The V-ways on both table and cross slides are hand scraped for perfect straight line motion. Hand fitted adjustable tapered gibs assure initial and continued fit and alignment.

Table dimensions are 14 x 36



in. It has 20 in. of longitudinal travel, 16 in. cross travel, and 17 in. vertical travel. Spindle travel is 4 in. Horizontal space between columns is 17½ in.

A Bridgeport 1 hp, eight speed milling, drilling, and boring head is standard on the machine. Other milling heads are optional.

For more information, *write*

LET'S TALK WIRE!

These lock washers are typical of many types and sizes of lock washers made from PAGE wire—and lock washers are just one of the many end products for which PAGE manufacturers wire is a logical choice.

Regardless of your use of wire, you can count on PAGE uniformity. Whether you make hairpins or lock washers, PAGE wire will give you the tensile strength, ductility, finish, tolerance and other properties you require.

PAGE facilities are designed to produce a wide range of high quality manufacturers wire items—including special shapes. Where requirements are exacting, you will find PAGE wire unexcelled.

Since 1902, we have pioneered many "firsts" in the wire industry. The latest of these is corrosion-resistant ACCO *Aluminized* Wire—commercially pure aluminum bonded to a steel core.

Why not put PAGE experience and knowledge to work for you to improve your product and lower your costs.

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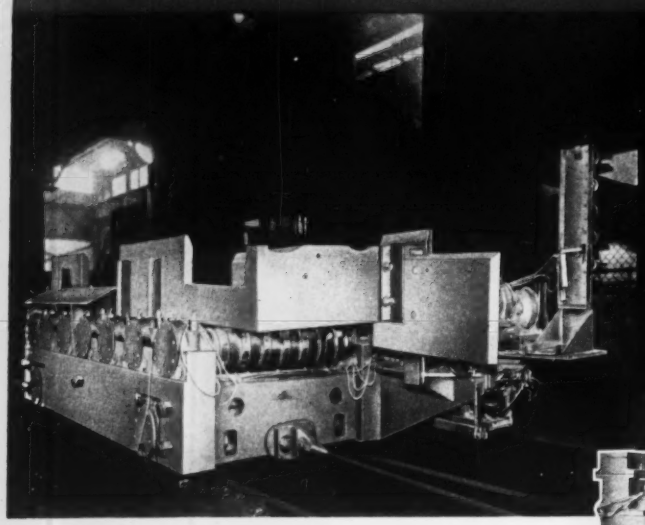
PAGE *—the source for answers to wire problems*

TREADWELL

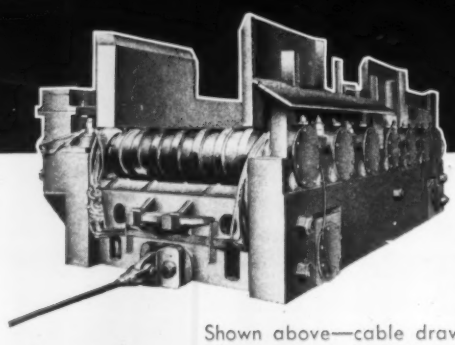
cable-drawn

table-top INGOT CARS

handling two 15-ton ingots... at a speed of 800 ft. *per minute*



Treadwell engineering was called on to develop the speed and efficiency needed for handling heavy ingots at high rates of speed. This ingot car has table rollers that are carried by anti-friction bearings and the axles are anti-friction bearing mounted. Write to Treadwell for any information on ingot cars.



- The table rollers are driven by Cleveland worm and gear sets and a Farval system for lubricating all bearings is built into the car.

Shown above—cable drawn table top ingot car at work in a major steel plant.

TEC CO

TREADWELL

ENGINEERING COMPANY • EASTON, PA.

SALES AND ENGINEERING OFFICES:

208 S. LA SALLE STREET
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CEntral 6-9784

140 CEDAR STREET
NEW YORK 6, N. Y.
WOrth 4-3344

1015 FARMERS BANK BLDG.
PITTSBURGH 22, PA.
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Manipulators, Mill, etc.
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Beds, Cooling,

Mills, Vertical Edging
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers

Beds, Inspection
Bumpers, Furnace
Pushers, Furnace
Repeaters
Handling Equipment (Kick-offs, Pilers, Cradles, etc.)

CASTINGS—Electric Furnace Steel, Ductile Iron, Gray Iron and Ni-Hard

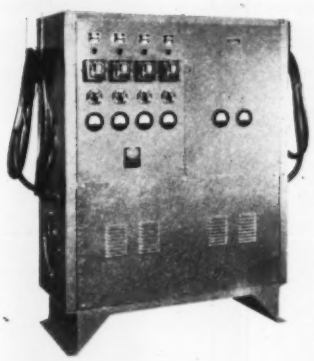
NEW PRODUCTS and equipment

Williams & Hussey Machine Corp., Clinton Street, Milford, N. H.

Automatic Battery Charger Is Compact, Portable

BATTERIES for motorized hand and rider type lift trucks can be charged automatically with the Portapak, a four-circuit charging unit.

Batteries are connected by cable. Charging is started by turning a



timeclock knob to 3-hour position which starts the motor-generator and closes a contactor. A temperature compensated voltage relay senses the voltage of the battery when it is about three-fourths charged and cuts the rate for final charging.

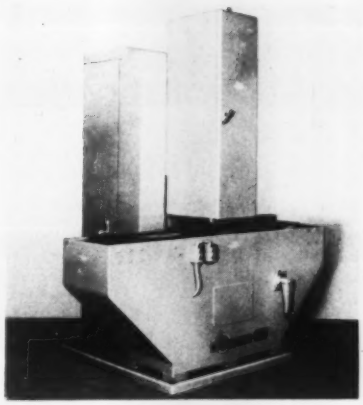
Easily portable with a lift truck, the unit is available in generator capacities from 3 to 15 kw.

For more information, *write* Motor Generator Corp., W. Water Street, Troy, Ohio.

Abrasive Belt Machines Finish Parts 15 in. Wide

THESE MACHINES will do abrasive belt grinding, polishing, and deburring operations on flat surfaces of bars, strips, coils, blanks, extrusions, stampings, forgings, diecastings, and sand castings up to 15 in. wide and 8 in. thick.

Made in two models, the KC with a conveyor belt feed, and the KP with a pinch-roll feed, the machines will finish parts made of metal,



plastic, ceramic, wood, or rubber. As many units as necessary can be arranged in tandem on either model to produce the required successive grit finish.

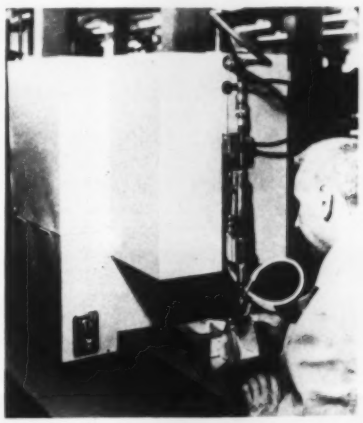
Both machines have pneumatic belt tension, positive manual or automatic belt tracking, micrometer grind pressure adjustment, V-belt drive that permits abrasive belt speed changes, infinitely variable control of speed of conveyor belt or pinch-roll feed, and easily changed contact rolls and conveyor belts.

For more information, *write* Acme Mfg. Co., 1400 E. Nine Mile Rd., Detroit 20, Mich.

Automatic Gun-Type Unit Feeds, Drives Setscrews

AUTOMATIC socket setscrew feeding and driving can be done in a portable machine. The driver will automatically receive and drive screws at distances 15 ft or more from the machine.

As many as 2000 standard socket setscrews can be fed and driven in an hour. The screw is fed to a



selector from a rotating hopper. From the indexing mechanism, the correctly positioned screw is carried by air through a flexible tube to the air powered driving gun.

For portable use, the gun is held by hand. Pressing the trigger on the gun cycles the selector and sends a screw through the tube to the gun.

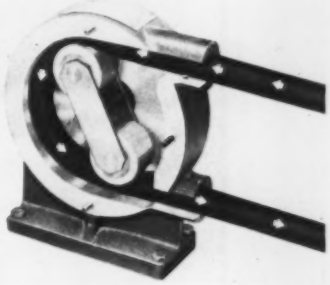
A clutch mechanism prevents the screw driver from tightening a screw beyond the preset torque or depth.

For more information, *write* Bristol Co., Waterbury 20, Conn.

Pump Handles Corrosives, Abrasives, or Gases

DESIGN of the Randolph pump allows it to handle corrosives, abrasive slurries, sterile solutions, or gases without contacting the material being pumped.

A flexible tube passes through



the pump body where it is exposed to the squeegee action of a double rotor. The result: An even flow of liquid or gas through the tube.

It is offered in two models, 54 and 185 gallons per hour. It is available with or without the motor; also with speed controls and explosionproof fittings.

For more information, *write* Randolph Co., 1018 Rosine St., Houston 19, Tex.

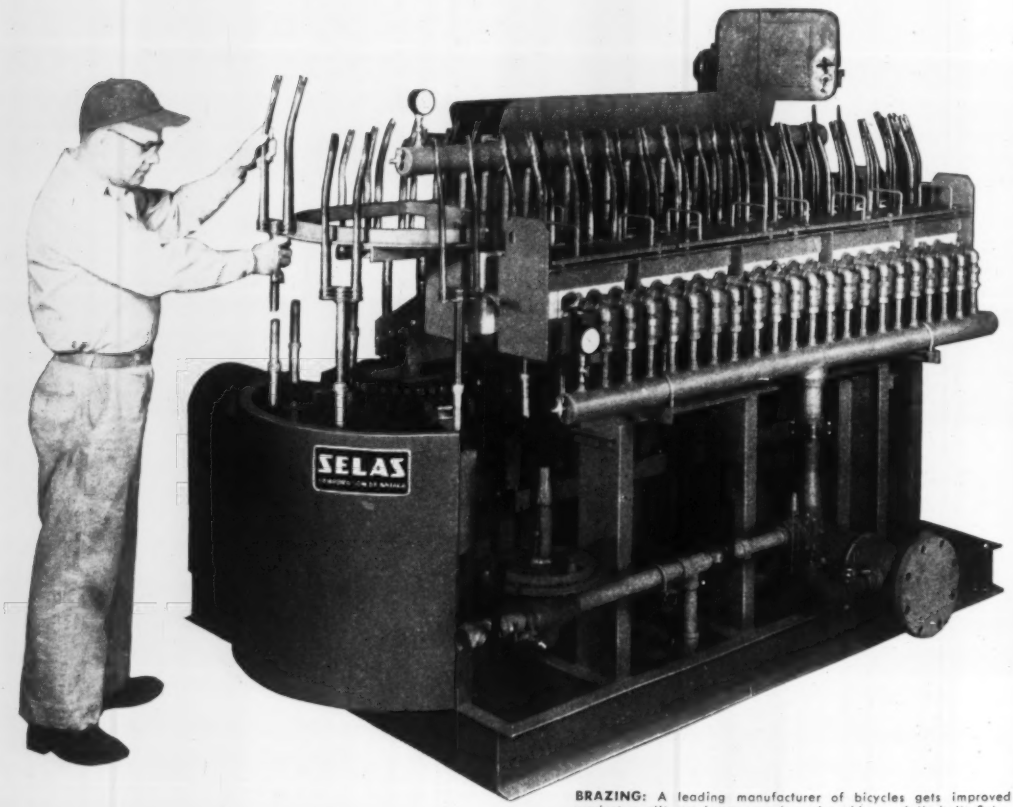
Personnel Carrier Can Do Variety of Hauling Jobs

YOU CAN convert the Station Wagon from a personnel carrier to a burden carrier by removing the leather covered seats (see photo).

As a burden carrier, it can han-

(*Please turn to Page* 156)

IMPROVE YOUR PRODUCT... LOWER YOUR COSTS
...with Selas Automatic Heat Processing



BRAZING: A leading manufacturer of bicycles gets improved product quality at lower cost by using this specially-built Selas automatic machine to braze forks to handle-bar stems. Assemblies, held in fixtures on 5 in. centers, are conveyed through Duradiant®-fired heating zone in a continuous operation. Following heating to 1650°F (the melting point of the brazing alloy), brazed assemblies are air-cooled to solidify the alloy, then water-quenched and cooled at discharge end of the compact (6 x 9½ ft) straight-through machine. Production rate is 300 per hr and fixtures may be adjusted quickly to accommodate various fork and handle-bar stem sizes.

Selas automatic machines are extensively used for production heat processing operations, including annealing, heat treating, brazing and soldering, forging and localized hardening.

The installations shown on these pages demonstrate how Selas automatic heat processing equipment can:

- increase production speed
- save fuel and operating costs
- minimize in-process inventory
- reduce manpower requirements
- save valuable floor space
- improve product quality

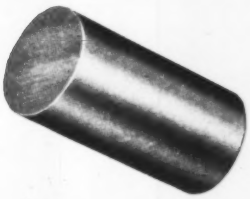
Individually designed and custom-built to meet your specific production requirements and job specifications, Selas automatic machines employ time-proven standardized engineering features for longtime operating dependability and minimum initial cost. In addition, you avoid problems usually associated with divided responsibility since Selas starts-up and services every machine it designs and builds.

A Selas automatic machine can prove beneficial in your plant. At your convenience . . without cost or obligation to you . . a Selas field engineer would welcome the opportunity to survey your needs.

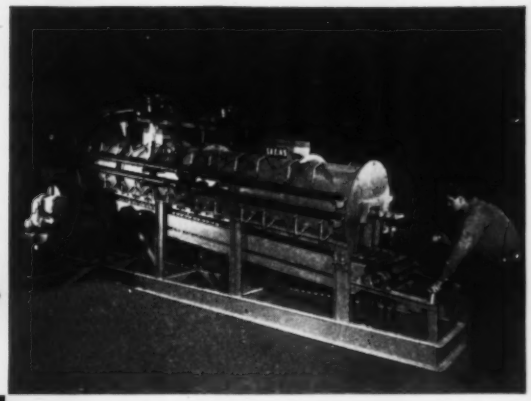
For this personal service—or for literature on any of the heating operations shown on these pages—address Dept. 28, Selas Corporation of America, Dresher, Pa.

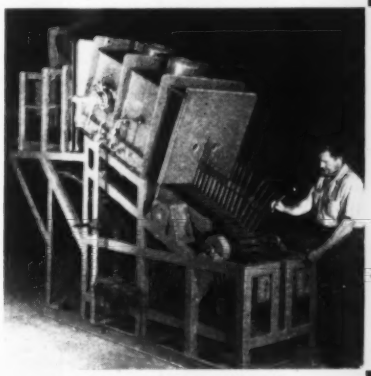
Duradiant and Gradiation are registered trade names of Selas Corporation of America.

SUBSIDIARIES: Selas Constructors, Inc., Houston, Texas; Selas Corporation of America, European Div., S. A., Pregny, Geneva, Switzerland.
INTERNATIONAL REPRESENTATIVES AND LICENSEES: CAMBODIA, FORMOSA, KOREA, LAOS, VIETNAM—Cosa Export Co., Inc.; AUSTRIA, GERMANY—Indugas, Essen; JAPAN—International Machine Co., Ltd., Tokyo; ITALY—Italiana Gasogeni E. Forni S.r.l., Milano.

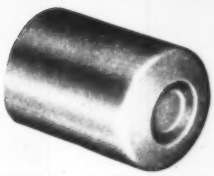


HEATING FOR FORGING: In order to create a more readily saleable product, characterized by fine grain size and better physical properties, a forging shop heats brass slugs with this Selas automatic Gradiation® equipment. Slugs vary in size from 7/8 to 2 in. diam, 2½ to 8 in. in length. Maximum weight per slug is 4 lb and machine heats at rate of approximately 2,000 lb per hr to uniform temperature of 1390°F. Piece production rate for smallest slugs is 800 per hr. Precise positioning on work fixture, typical Selas fast heating and split-second removal of heated slugs from chamber contribute to production of higher-quality forgings.

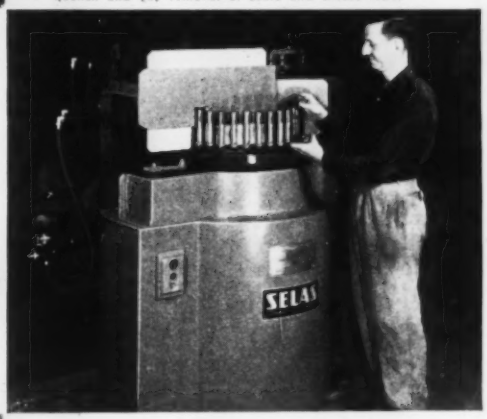


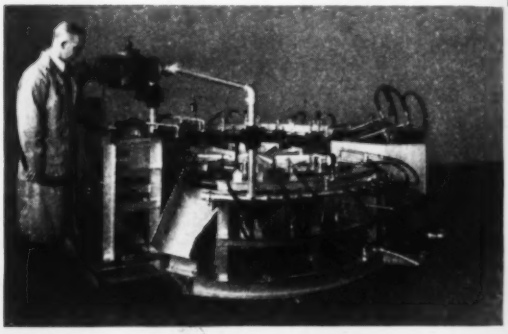


HEAT TREATING: Designed and built by Selas, this automatic heat processing machine eliminates costly, hazardous lead baths conventionally used to harden stainless steel knife blades. Compact machine (9 x 3½ ft floor space) requires only one operator for entire process. Hand-loaded, blades are quickly brought to 1950°F without scale formation, are uniformly hardened to Rc 42/44 while handle retains full softness to permit design embossing. Angle-mounting permits operator to work at shop floor level; collecting-baskets conform to 4 ft level of existing materials handling system. In addition to saving plant space, reducing manpower requirements and improving safety conditions, Selas machine eliminates two operations: (1) an oil quench and (2) removal of scale and excess lead.



ANNEALING: Unique Selas gas-fired machine anneals brass door knob blanks—automatically in the production line—as part of a completely integrated manufacturing process. Selas Superheat burners fire a narrow jet of high velocity, high temperature gases at a 1⅜ in. band on sidewall of blank. Annealing, cooling and discharge, accomplished in 9 sec, are geared to production line output of 60 finished knobs each minute. Fast Selas heating by non-oxidizing combustion gases achieves a cleaner, brighter end-product . . . eliminates need for muffles or prepared atmosphere.





SELECTIVE HARDENING: The end portions of brake shoe webs must be hardened to create a more durable product. Selas automatic machine employs an indexing conveyor which brings just the two ends of webs under Duradiant burners. Designed for automatic loading, the rotary machine heats, quenches, tempers and mechanically unloads the selectively-hardened workpieces. Service life of webs has been materially extended, costs have been reduced by precise heating of selected areas. Burners may be adjusted to accommodate a variety of brake shoe web sizes.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers

DEVELOPMENT • DESIGN • CONSTRUCTION

(*Continued from Page* 153)

dle long loads, packages, mail, maintenance equipment, production parts, and similar products. Equipped with a suitable coupler, the truck can also be used as a towing tractor.

It is furnished with a 12 or 24 volt battery capable of providing speeds up to 10 mph. Controls are arranged in automotive fashion with wheel steering, foot operated brakes, and a speed control pedal which provides four speeds forward and reverse.

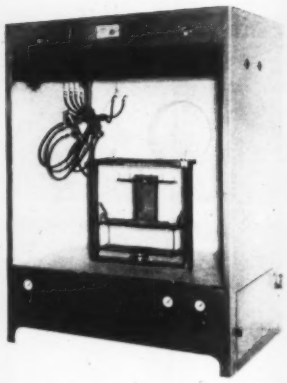
For more information, *write* Moto-Truc Co., 1953 E. 59th St., Cleveland 3, Ohio.

Automatic Spray Machine Can Paint Three Surfaces

THIS machine allows you to paint one, two, or three surfaces of generally oval or rectangular shaped pieces of varying lengths, where fine mask definition and paint demarcation are imperative.

The length and speed of the painting stroke are adjustable within the limits of the size of the model selected.

A device which embodies a foreshortened pivoting action permits

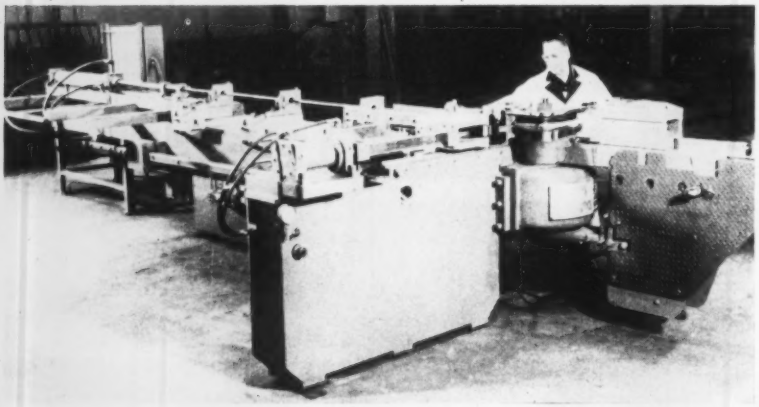


tilting of the overhead traveling guns in one or two directions as well as the painting in both directions when the part is in painting position. Paint coverage is assured under all mask bridging, hard to reach recessions, corners, and edges of the part, with a reduction in overtravel and a saving of paint.

Standard gun mounting rods may be used on this single vertical fixture machine, which is designated as Model SVF. The square shaft, vertical fixtures alternately lower and raise the part, placing it snugly in the mask for painting.

For more information, *write* Conforming Matrix Corp., 345 Toledo Factories Bldg., Toledo 2, Ohio.

Bends Thin-Wall Tubes on Short Radius



PRECISE bending of thin-walled tubes can be done on a line of Pines hydraulic benders.

The use of a hydraulically operated, direct acting pressure die greatly reduces setup time and scrap loss. The amount of force on the pressure die can be read and recorded from a gage, making possible subsequent setups on the same or similar parts without costly experimentation.

The direct acting die also reduces the tendency for tubing to wrinkle or rupture during a bend. Because it applies pressure directly in line with the tube center line, it automatically compensates for slight variations in wall thickness or minute machine or tooling deflections.

Because most thin-walled tubing cannot be hand loaded over a mandrel, but must be clamped in place and the mandrel inserted under pressure, the bending machines feature a hydraulic mandrel loading-extracting cylinder with a 48 in. maximum stroke that is adjustable to suit requirements.

For more information, *write* Pines Engineering Co. Inc., 601 Walnut St., Aurora, Ill.

Barrel Finishing Compound

FAST cutting action and fine surface refinement are combined in a dual purpose abrasive compound known as Esbec 680.

The compound works well on most metals, including steel, stainless, copper, brass, and aluminum.

During the first 2 to 5 hours, the material cuts extremely fast and greatly shortens cutting cycles.

At the end of the cutting action, the abrasives break down and become polishing agents which produce excellent surface finishes on almost any type of metal. When completely broken down, it is finely pulverized and can be easily rinsed from the load.

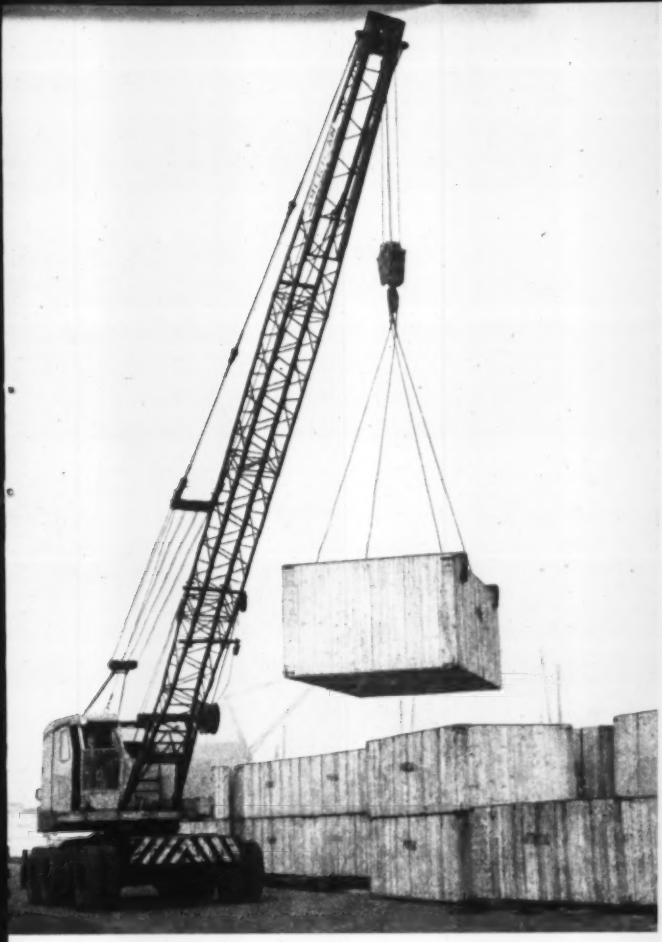
For more information, *write* Esbec Barrel Finishing Corp., P. O. Box 929, Stamford, Conn.

Welder Has Wide Range

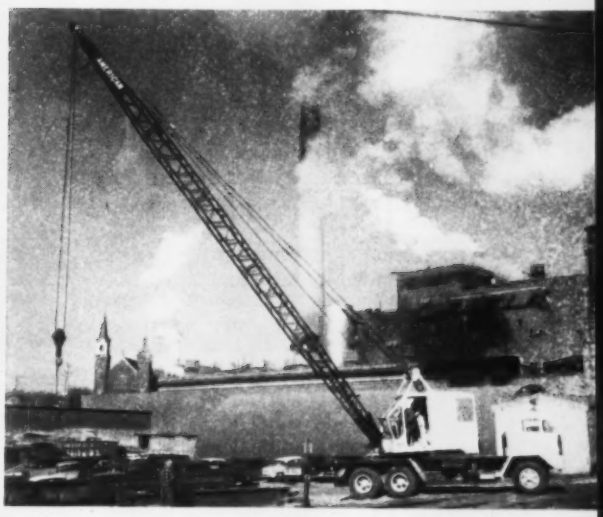
PRODUCTION, general maintenance, and repair shops can use the

MATERIAL MOUNTAINS MASTERED WITH AGILE AMERICANS

Crowded, busy yards or plants are a push-over for mobile Americans. Handling costs are shaved because seconds are saved, with the extremely maneuverable American Truck and Self-propelled Cranes. They provide *smoother lifting . . . precision spotting . . .* to help you get more work done in your efforts to keep materials moving.



This 300 Series Self-propelled yard crane speeds up the unloading of crated autos for export at a Hoboken, N. J. pier.



Ideal for all kinds of yard duties, American 200 Series Truck Cranes are made specifically for tight budgets, tight quarters, tight schedules.

SMOOTHER LIFTING . . . PRECISION SPOTTING

- When you have two speed transmissions on American Truck and Self-propelled cranes you are assured accurate placing of loads without loss of horsepower.
- When the operator changes gears with the control lever, he automatically lowers his line speed, yet retains full horsepower without slipping clutches. This means a smoother swing . . . smoother, safer spotting of maximum loads . . . new control accuracy for steel erectors, bridge builders, shipyards, industrial plants . . . wherever loads need handling with infinite accuracy.
- Next time you see an American on the job, ask the operator . . . ask the owner . . . to show you how Americans are built to give you better service. Then contact your American distributor. He has complete detailed and illustrated catalogue information on American's entire line of crawler or truck crane models, capacities ½-yard, 12½ tons and up.

Serving industry for over 75 years

EXCAVATORS-CRANES to 2 yds.-60 tons
LOCOMOTIVE CRANES to 130 tons
DERRICKS-HOISTS to 800 tons
REVOLVER CRANES to 400 tons

AMERICAN HOIST
and Derrick Company
St. Paul 7, Minnesota

AMERICAN HOIST PACIFIC COMPANY
Special materials handling equipment

CROSBY-LAUGHLIN DIVISION
Drop forged fittings for wire rope-chain

NEW PRODUCTS and equipment

Miller M-295 welder.

Features include fast, precise current settings through a moveable shunt; two current ranges: 25 to 115 and 80 to 295 amperes; high open circuit voltage; forced draft cooling; and baked enamel case with rust preventive prime coating.

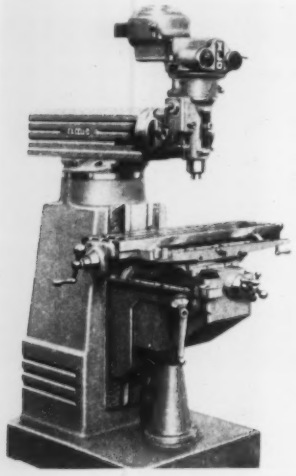
Wired for 230 or 460 volt service, the M-295 is available with power factor correction, special voltages, and complete accessory package.

For more information, *write* Miller Electric Mfg. Co., Inc., Appleton, Wis.

You Dial Spindle Speeds On This Ram Turret Mill

THERE'S no need to change belts to get an approximate speed on the Ex-Cell-O ram turret milling machine; spindle speeds are infinitely adjustable within a practical range by turning a dial.

The milling head pivots in planes parallel to the worktable and at right angles to it. Power feed to the spindle is standard, with three speeds available in both directions. The power feed can be disengaged when not required and the spindle can be braked to an instant stop.

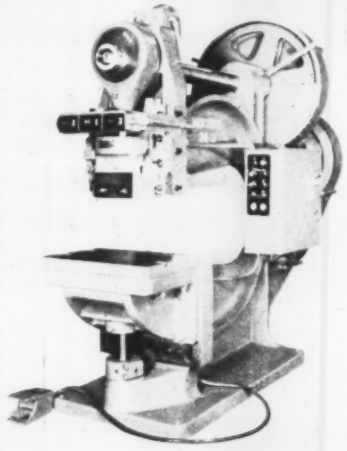


A ram turret, which can be pivoted to any angle, supports the milling head, and a manually operated pinion and rack provide lateral positioning of the head.

For more information, *write* Ex-Cell-O Corp., 1200 Oakmand Blvd., Detroit 32, Mich.

Deep Throat Presses

YOU CAN do light and medium punching, cutting, and flanging on large pieces in the Minster Series



20 deep throat punch presses. They are built in 15, 25, and 35 ton capacities.

A heavy section, C-type, one-piece, high alloy cast iron frame forms a deep throat that allows punching to the center of a 60 in. circle. Two extra long, accurately ground, removable gibs guide the slide. Standard slides have removable slide punch caps and crossbar knockouts.

The Series 20 presses can be equipped with an adjustable bed when varying die space is needed. Three presses in the series are equipped with the Minster combination air friction clutch and brake. Its advantages include inching the punch down to a center mark prior to tripping; smooth, high speed engagement, and a minimum of wear over long years of service.

For more information, *write* Minster Machine Co., Minster, Ohio.

NEW literature

Write directly to the company for a copy

Applications for Air Units

How "air may do the job" through use of air motors, compressors, and vacuum pumps is the subject of a 12 page booklet. Gast Mfg. Corp., P. O. Box 117, Benton Harbor, Mich.

Stainless Weld Fittings

A 12 page booklet, FB-78, guides you in the selection of carbon, alloy, and stainless steel welding fittings and flanges. Tubular Products Div., Babcock & Wilcox Co., Beaver Falls, Pa.

Engineered Weighing Systems

An eight page booklet describes 5000 lb capacity weighing cells and the instrumentation which can be used with them. A. H. Emery Co., Pine Street, New Canaan, Conn.

Leaded Steel Forgings

A 40 page data book documents case history, mechanical property, and machining tests of Hi-Qua-Led lead additive steel forgings. Alco Products Inc., P. O. Box 1065, Schenectady, N. Y.

Applications for Stainless

A bimonthly publication, *Explorer*, reviews new developments and applications of stainless for industrial, commercial, and defense products. Stainless and Strip Div., Jones & Laughlin Steel Corp., Detroit 34, Mich.

High Temperature Brazing Flux

Engineering data sheet 2.2.3 discusses Nicrobraz Vapo-Flux, which produces good wetting and flow of brazing alloys in marginal or poor dry hydrogen atmospheres. Stainless Processing Div., Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich.

Powder Metallurgy Bearings

Information on how you can reduce costs with iron Oilite bearings and bushings is given in a four page brochure. Amplex Div., Chrysler Corp., P. O. Box 2718, Detroit 31, Mich.

Motor Speed Reducers

The complete line of Falk all-motor and integral motoreducers is discussed in revised bulletin #3100. Falk Corp., Dept. 255, Box 492, Milwaukee 1, Wis.

High Strength Fastener

A 16 page brochure, Form 8-388, describes the Conical Keystone Lock blind rivet for high-strength structural fastening. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

Thread Specification Chart

A wall or desk chart shows details of unified and American external screw threads. Ohio Rod Products Co., 20259 First Ave., Berea, Ohio.

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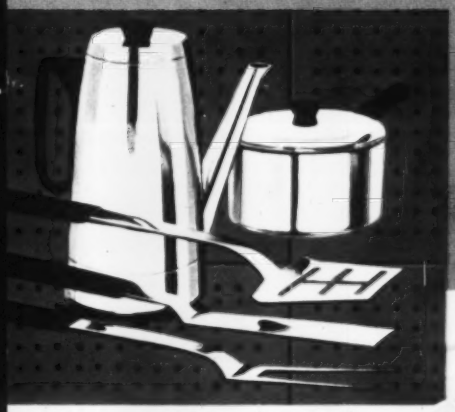

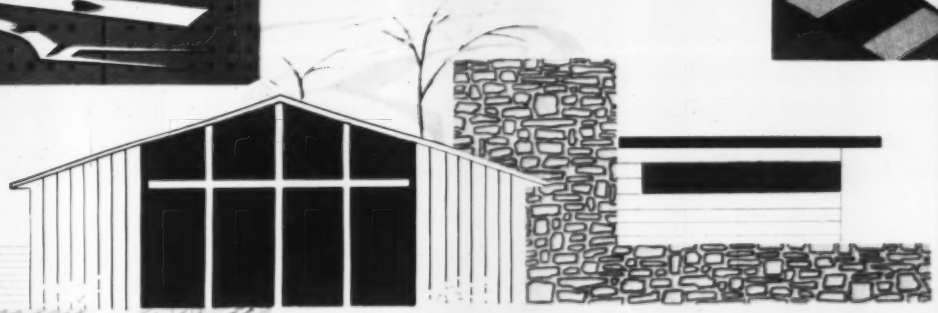

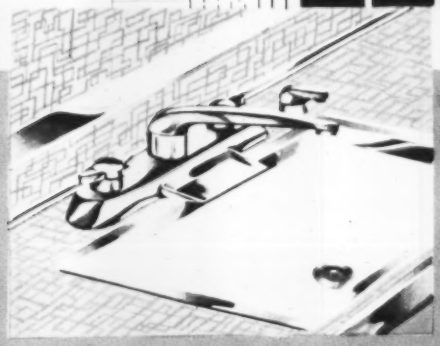

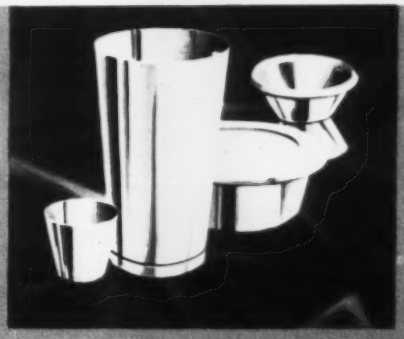

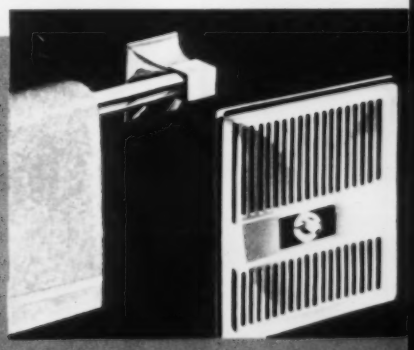

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STAINLESS STRIP STEEL

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OF

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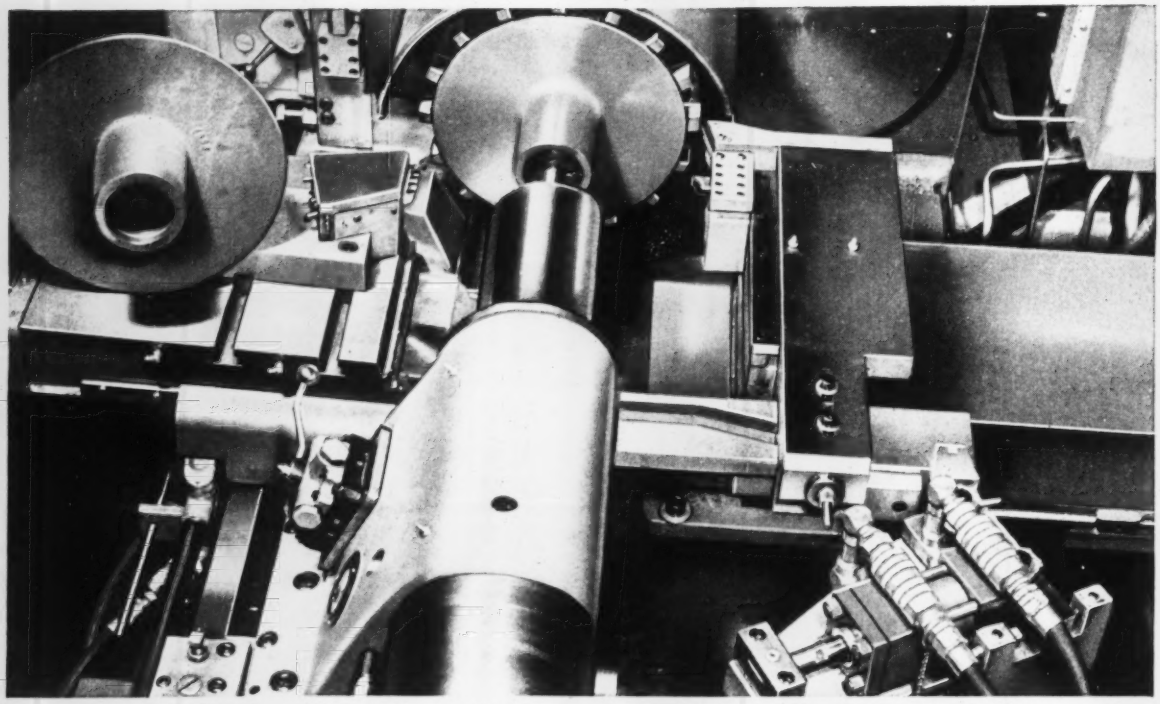


Note how 16-jaw chuck grips 10″-diameter, inner pulley disc on narrow portion of O.D. This permits machining entire flange face. Accurate taper is generated by cam-operated sliding toolholder shown at right.

No. 12 replaces two manual lathes, cuts time 53%

Automatic cycle, fast setup cut job-lot costs...free operator for other work.

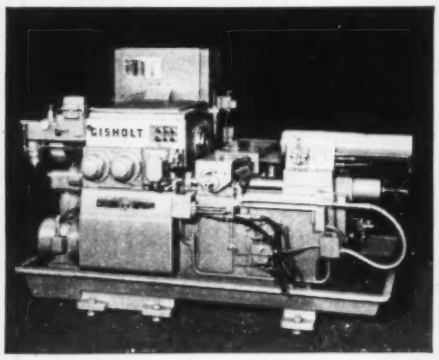
This fast, versatile setup may give you some new ideas on paring job-lot costs. Lewellen Manufacturing Company, Columbus, Indiana, uses it for machining three types of cast iron pulley discs in 15 sizes—in lots ranging from 50 to 100 pieces.

Previously this work required two manually operated lathes. Now one operator does the entire job 53% faster on one Gisholt No. 12 MASTERLINE Automatic Chucking Lathe.

Here's how a typical inner pulley disc, 10″ in diameter, is handled: To permit machining beyond the tapered face, the work is held on a narrow portion of the previously turned O.D. in a 16-jaw chuck. A chuck-mounted mandrel with tailstock support provides rigidity for higher speeds and feeds.

Front carriage tools turn the hub O.D. within .0005″ and form the base radius. The flange is taper-faced from a cam-controlled sliding toolholder on the rear independent slide. A second tool faces the hub end. Time, just 2.2 minutes, f.t.f.

Change-over for different sizes averages less than 30 minutes. One 30° adjustable cam handles all tapers. Quick-disconnect fittings are easily reversed for tool relief when changing from inner to outer discs.



Gisholt MASTERLINE No. 12 Automatic Chucking Lathe

FOR COMPLETE INFORMATION

on how the No. 12 can cut your costs on job-lots and production runs, contact your Gisholt Representative—or write for new catalog, Form 1213.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • *Factory-Rebuilt Machines with New-Machine Guarantee.*

Investigate Gisholt's Extended Payment and Leasing Plans

August 10, 1959

Steel Users Unworried as Strike Continues

IT'S BUSINESS AS USUAL in most metalworking plants as the steel strike finishes its fourth week.

Most inventories are sufficient to sustain full production for the balance of the month. Among the major consumers (automakers and appliance manufacturers), supplies are adequate for the next 60 days. Automotive consumption will drop sharply during the next six weeks because of model changeovers. Combined output of cars in August and September won't exceed July assemblies. Vacations in other industries will brake the inventory runoff for another week or two.

IMBALANCES FEARED— When trouble comes, it will be because stocks are out of balance. That may happen in isolated cases within a few days. Some users are sure to run out of vitally needed alloys, widths, or gages even though their inventories of most items are well above normal. As shortages appear, consumers will try to get what they need from service centers.

DISTRIBUTORS SEE PICKUP— Since there hasn't been any stampede to the service centers yet, it's apparent that users' inventories are still in reasonably good shape. When the strike began, distributors' stocks were at an all-time high (3.7 million tons). Two weeks later, they were only 100,000 tons lower. Reason: Sales were slow and tonnage received from the mills partially offset shipments. Business has improved steadily since Aug. 1. American Steel Warehouse Association estimates that service center inventories are being depleted by 150,000 to 200,000 tons a week.

MILLS BOOKING SLOWLY— Consumers are in no hurry to book additional tonnage, another indication that they're pretty well pleased with their inventories. Mills are accepting orders without specifying delivery dates. They'll have to clear up second quarter carryovers and tonnage booked for July, August, and September before they roll anything that's being entered now.

FOURTH QUARTER PROSPECTS— If the walkout ended now, industry steelmaking operations would average about 80 per cent of capacity during the fourth quarter, says U. S. Steel's chairman, Roger M. Blough. If it lasts until Sept. 15, operations may be in the high nineties during the final three months, other steelmen believe.

FABRICATORS WELL STOCKED— Eight out of ten structural fabricators have enough steel on hand to continue operations at the current level for three months or more, says the American Institute of Steel Construction. Included in the less fortunate 20 per cent are a few firms that are shut down because their employees are represented by the United Steelworkers. Others have steel supplies adequate to sustain operations for only a month or two.

PRODUCTION AT LOW EBB— Last week, steelmaking operations slipped to 12 per cent of capacity, off 0.2 per cent from the preceding week's revised rate. Production was about 340,000 ingot tons. July's output, sharply curtailed by the strike, was only 5.5 million tons—little more than half of June's 10.9 million.

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*Current prices were published in the Aug. 3 issue and will appear in subsequent issues.

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has done...is doing...
and will do...many jobs better than
any other metal. Western Brass
is "tailor-made" for
each job.

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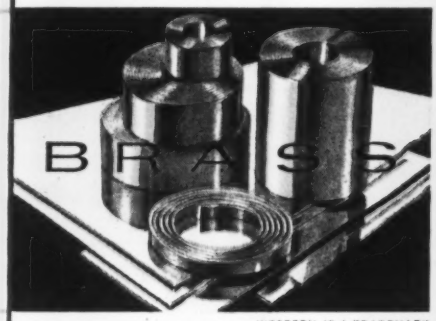

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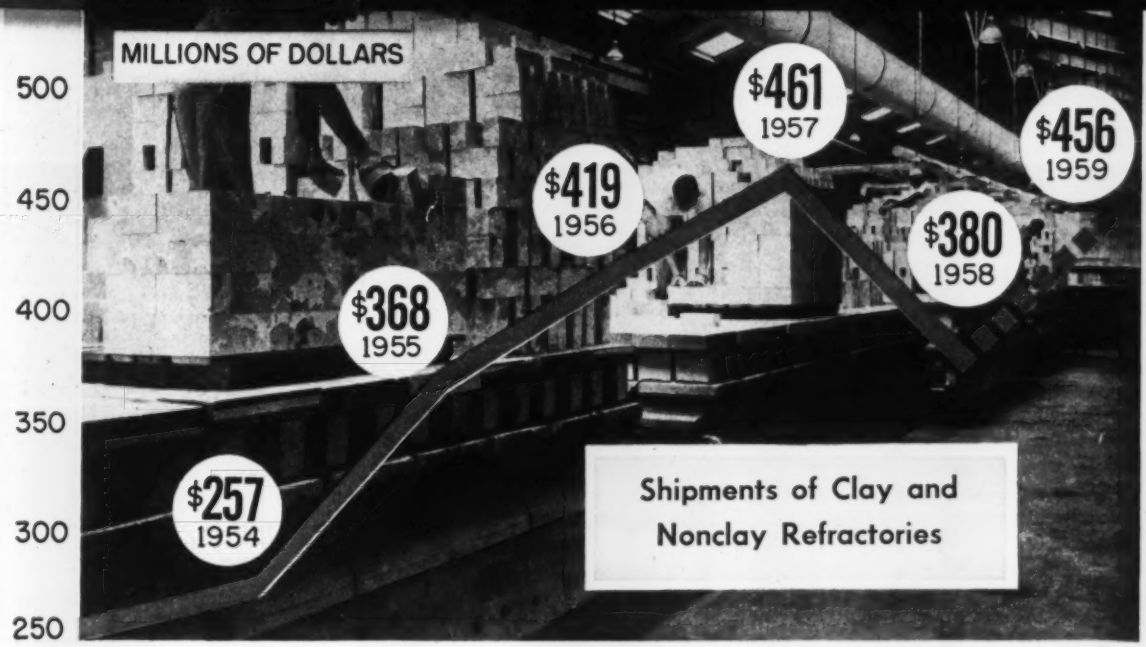


Projection estimated by STEEL.
Data from Bureau of the Census.

Refractories Slowed by Steel Strike

REFRACTORY shipments were at a near record pace in the first half. Producers are confident this year will rank with the best in sales if the steel mills aren't closed too long.

Business in the late months of this year may be a lot better than had been anticipated. More furnaces may require relining because of the strike—equipment that has been idle often needs extensive repairs before production is resumed.

• **Most industry authorities are certain the year's volume will at least show a substantial gain over the relatively poor showing in 1958.**

Prestrike estimates of producers surveyed by STEEL, placed 1959 dollar volume at 14 to 25 per cent over last year's. Allowing for a moderate strike loss adjustment, a 20 per cent increase seems conservative. That would bring 1959 volume to around $456 million vs. $380 million last year and second only to the record $461 million in 1957 (see chart).

In the first quarter, shipments were valued at $107.5 million vs. $108.7 million in the last quarter of 1958 and $81.8 million in the first three months of that year. If the 1958 shipment pattern is fol-

Where Refractories Go

IRON and STEEL: Air furnaces, annealing furnaces, coke ovens, cupolas, electric furnaces, forge furnaces, galvanizing and tin plating furnaces, blast furnaces and stoves, ladles, malleable iron furnaces, metal mixers, open hearth furnaces, oxygen blown converters, reheating furnaces, soaking pits.

NONFERROUS METALS: Aluminum melting furnaces, brass and bronze melting furnaces, carbon baking furnaces, copper converters, copper reverberatory and refining furnaces, lead smelting and refining furnaces, magnesium and sodium furnaces and cells, nickel smelting and refining furnaces, petroleum coke calciners, precious metal furnaces, tin furnaces, titanium and zirconium chloride furnaces, zinc furnaces.

CEMENT, GLASS, CERAMICS: Cement kilns, ceramic kilns, enameling furnaces, frit furnaces, glass tank furnaces; magnesite, dolomite, and lime kilns.

CHEMICALS: Acid and chemical constructions, digesters, paper industry smelters, petrochemical equipment, phosphorous and phosphate furnaces, silicate of soda furnaces.

POWER, FUELS, and OTHER: Butadiene reactors, carbon black furnaces, domestic heating furnaces; electrolytic reduction, refining, and plating cells; gas producers, gas reformers, incinerators, industrial stacks, industrial heating furnaces, missile launching pads, oil-gas sets, oil refining and processing furnaces, steam power furnaces, sulfur burners.

lowed, business should progressively rise in the closing months of this year.

Refractories are used in many widely diversified types of furnaces making steel, aluminum, copper, and other metals, as well as cement, glass, and steam generated power (see box, Page 163). Consumption, in general, has been growing, with the possible exception of use in industrial boilers, steam generation, and water cooled foundry cupolas.

• **Sales volume is largely influenced by the trend of steelmaking operations.**

That explains the high proportion of refractory business done with the steel producers (up to 70 per cent of volume for some makers). It's borne out by the record since ingot production turned upward in May, 1958, marking the turning point in the business recession. However, refractory volume, at times, outpaces steel production. This is shown by the record of the last decade or so and is explained largely by heavy requirements for the steel expansion program, which boosted ingot capacity 61 per cent since World War II.

Advances in steelmaking practice are increasing the use of refractories, particularly basic and synthetic high temperature materials. Significant developments include the swing to basic roofs for open hearth furnaces and the introduction of linings suitable for basic oxygen converters.

At the end of 1958, of the more than 900 open hearths in the U. S. and Canada, 112 had been converted to basic roofs. Shipments of refractories to oxygen converters are up sharply—one large producer reports a 64 per cent rise over year ago shipments. Requirements for coke ovens, cement plants, and steel vessels of various types continue heavy.

• **Consumption is also being stimulated by steady growth in the petroleum, petrochemical, and glass industries.**

In the nonferrous metal field, significant gains in consumption are noted. Makers of specialized refractories report increased requirements for aluminum reduction cell linings.

In addition to standard and specialized refractories, producers also turn out a wide range of chemical and metallurgical lime and magnesia products. They have broad marketing possibilities in the chemical, petroleum, synthetics, and building industries. Calcined magnesite is used in processing uranium ores.

• **Refractory stocks are adequate for current demands, with some makers' inventories of all types at a high level.**

Imports of refractories are not large and present no particular competitive problem. Some makers, though, think they present a potential threat.

Exports are substantial. For some larger producers, they account for up to 25 per cent of their production. But this volume is shrinking.

There is little "price fighting" in this industry. Expectations are prices may range from level to slightly higher in the months ahead, depending on the steel wage settlement.

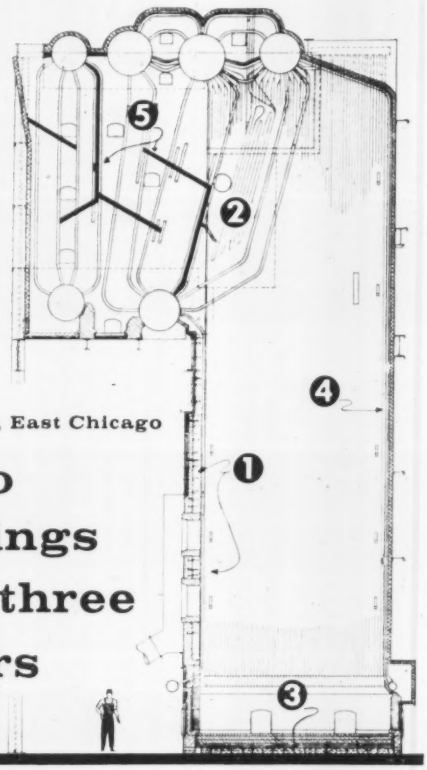
1 Burner walls mono-lined with super-duty Plibrico Jointless Firebrick.

2 Convection sections mono-lined with Plicast castable refractory.

3 Furnace floors mono-lined with Plicast LWI castable refractory.

4 Furnace walls mono-lined with Plicast. Enclosed with airtight welded steel casing.

5 High heat transfer baffles installed by Plibrico.



... at INLAND STEEL CO., East Chicago

Plibrico "zoned" linings selected for three 68′ boilers

Above drawing, one of three giant 68′ C-E boilers, shows how "zoned" construction matches various grades of refractory with temperature and operating requirements in each area.

One-piece lining lengthens service life . . . it is free from joints which permit penetration of destructive elements.

Settings and enclosures built by Plibrico Construction Corp. This division, specializing in large construction projects, works with local Plibrico distributor-engineers to assure you a competent and unified engineering and installation service.

Consult a qualified Plibrico engineer for a free appraisal to restore your old settings or plan a complete installation . . . WRITE FOR CATALOG ON BOILER SETTINGS.

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9359

Galvanized Sheet Shortage Reaches Critical Stage

A critical shortage of galvanized sheets has developed. Most galvanized sizes are completely out of stock in steel service centers, although supplies have been rationed to regular customers for several weeks.

Seymour Waldman, president, Rolled Steel Corp., Skokie, Ill., and Houston, says that in addition to the buildup for the strike, supply of galvanized sheets is short because of increased applications. Last year saw an all-time high in galvanized shipments, which would have been topped in 1959 if the strike had not occured. He cites stepped up use of galvanized in the automotive, appliance, building, heating and ventilating, and farm equipment fields.

These two instances where shortages have hampered operations in the Midwest can be duplicated at other points. Young & Greenawalt Co., manufacturer of corrugated pipe for culverts with plants in East Chicago, Gary, and Ladoga, Ind., and Shelby, Mich., laid off 40 of its 150 employees in four plants because of a shortage of galvanized sheets. The company supplies the pipe for the Illinois and Indiana highway departments. The men were told they would be returned to work two weeks after settlement of the steel strike.

Republic Metals & Roofing Materials Inc., Chicago, which uses large quantities of galvanized sheets, has curtailed its production 50 per cent. The company had 400 tons when the strike started and is down to 50 tons. The company says it had neither the money nor warehouse space for a bigger stockpile when the strike started.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 174 & 175

Of all major steel products, demand for sheets continues the strongest. Of the major grades of that product, supply of galvanized is the tightest, followed by cold rolled and hot rolled in that order. Although demand is well down from the prestrike volume when consumers were accumulating inventories, inquiry is fairly good and is increasing.

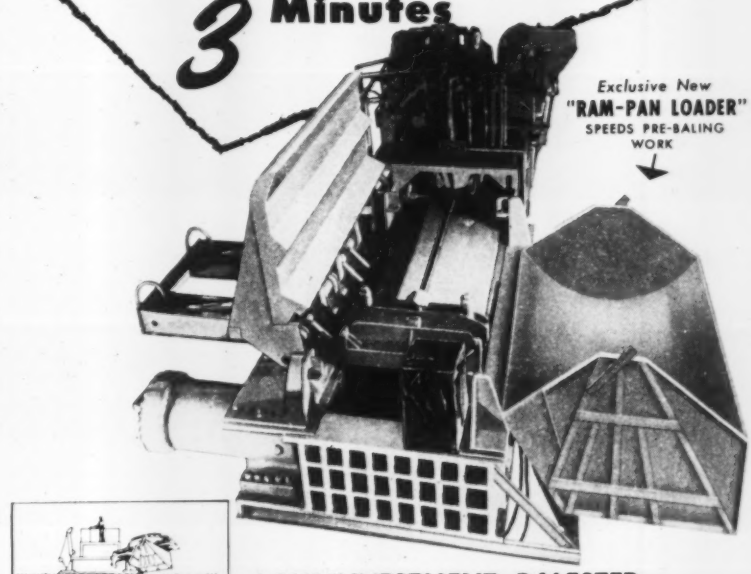
Consumers of flat rolled products have not felt a supply squeeze, but they are in no way complacent about it. They are placing more new business with the mills as wage negotiations appear as deadlocked as ever. All new tonnage being booked is for delivery at the convenience of mills.

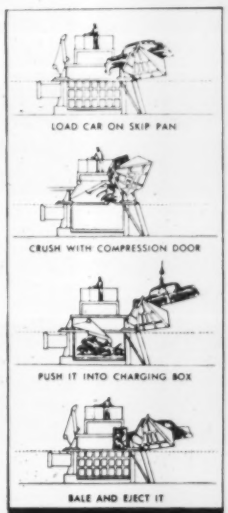
Order books of producers were pretty well filled with third quarter business when the strike was called. Some carryover from the second quarter was also on hand. The carryover and early third quarter bookings will get first position in mill schedules when production is resumed.

So far there have been no reports of hardship among consumers. Most users are well covered through August and in some instances beyond. When serious shortage talk does arise, it is likely to involve certain grades and sizes, rather than a general scarcity.

The effects of the slash in supplies are softened to some extent

New Power Packed "750 CS" Bales Car Bodies in Just 3 Minutes





DEMPSTER BALESTER

LOW-INVESTMENT BALESTER DOES WORK OF BIGGER PRESSES

In a feast-or-famine market, versatile equipment pays off! That's the reason for the new 750-CS which handles smaller scrap with unbeatable efficiency and bales car bodies at a pace only slightly off that of the big expensive presses. The powerful new "Ram-Pan Loader" with the curved bottom fits the arc of the compression door as it pushes the car down into the charging box, a pre-baling operation that takes less than a minute and reduces costly cutting or shearing work. All told, you've got a tight compact bale in *less than three minutes!* You'll like the many other new features of the 750-CS.

Mfd. By DEMPSTER BROTHERS, Inc.

WRITE TODAY FOR NEW BULLETIN ON 750-CS

DEMPSTER BROTHERS, Dept. S-8
Knoxville 17, Tenn.

by the gradual shutting down of auto assembly plants for model changeovers.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 174

More than 250 tons of concrete reinforcing steel from Bethlehem's Seattle plant are going into Alaska's first nuclear power plant at Ft. Greely, 85 miles southeast of Fairbanks. The $7 million plant is scheduled for completion next year.

Some of the first reinforcing steel to be rolled on Bethlehem's new merchant bar mill in Seattle is being used in the project. This rolling mill was placed in production in January.

Steel Bars . . .

Bar Prices, Page 173

Bar inquiry is slow as most leading consumers have substantial inventories and consumption has tapered due to vacations and other seasonal factors. Some business is trickling into sales offices, largely from customers seeking a favorable position in rolling schedules which will be effective as soon as the mills resume operations.

For the most part, orders are being accepted with the understanding that shipments will be subject to the delays occasioned by the strike. Generally, business booked now cannot possibly be shipped before the fourth quarter, even if the strike should end within the next couple of weeks. Reason: A substantial carryover tonnage on books at the end of the first half, most consumers having anticipated rather fully their third quarter requirements. This carryover tonnage will have preference over new bookings when the mills get back into production.

Furthermore, bar mills haven't much semifinished steel on hand and accordingly would have to build up tonnage before getting rolling operations back to normal. Contributing to the situation in semifinished is the fact that shipments were at a higher rate than production for some time prior to the walkout. Actually, that applies to other major products as well as to bars.

Several producers of cold finished bars in the Pittsburgh district continue to operate during the strike period. It's expected most of them will be able to arrange extensions of their labor contracts when they expire. Some of the cold drawers will be pinched for hot bar supplies if the strike at the hot mills drags into the fall.

Pacific States Steel Corp., Niles, Calif., shut down Aug. 1 when the firm was unable to negotiate a new contract with the union.

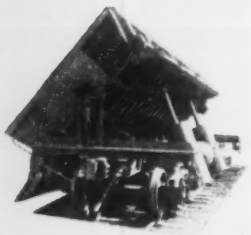
Stainless Steel . . .

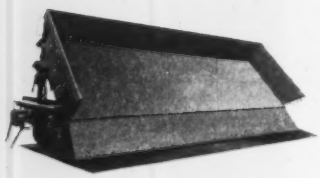
Stainless Steel Prices, Page 177

Production of Type 410 and Type 430 chromium stainless steel sheets and plates has been discontinued at the Middletown (Ohio) Works of Armco Div., Armco Steel Corp. Production of those two types of steel in sheets and strip will be concentrated at Armco's Butler (Pa.) Works where the company is more than doubling its capacity for flat rolled stainless production. Type 410 and Type 430 plates will no longer be produced at any of the company's facilities, says W. B. Quail, vice president-sales.

DESIGNED

FOR THE JOB—BUILT TO LAST!





Magor heavy duty air dump cars are designed to do just one job—speed-up waste disposal. Low height and greater size means faster loading—fewer trips. Automatic dumping eliminates expensive labor and crane equipment. Smooth car interiors eliminate "dead load" returns.

Made for the job, Magor Air Dump cars can cut your disposal costs as much as 40%! And because they're made to last, your maintenance costs will be cut too! Tapered body ends and double plate construction across load carrying members, for example, adds strength and years of service.

Magor engineers are ready to show you how to cut today's high costs down to size.

MAGOR

Write today for details and for the new folder describing the heavy duty air dump car.

MAGOR CAR CORPORATION

50 Church Street
New York 7, N.Y.

Tool Steel . . .

Tool Steel Prices, Page 177

Net shipments of tool steels, excluding hollow drill steel and shipments to members of the industry for conversion into further finished products or for resale, increased to 12,032 net tons in June from 10,009 in May and only 5048 tons in June of last year. Total net shipments for the first six months this year increased to 54,936 tons from 34,243 tons in the like period a year ago, reports the American Iron & Steel Institute, New York.

Tubular Good . . .

Tubular Goods Prices, Page 177

Producers of tubular goods are booking new business, but they are not under any particular pressure. Oil country goods consumers were pretty well stocked before the strike and are not likely to be caught short of supplies unless the walkout extends far into the fall.

Rotary drilling activity, as surveyed by Hughes Tool Co., Houston, declined sharply in the week ended July 27. The count was 2166 rigs at work, 30 less than the previous week and 182 below the first week of July. However, the rig count was still up 418 from the comparable week a year ago.

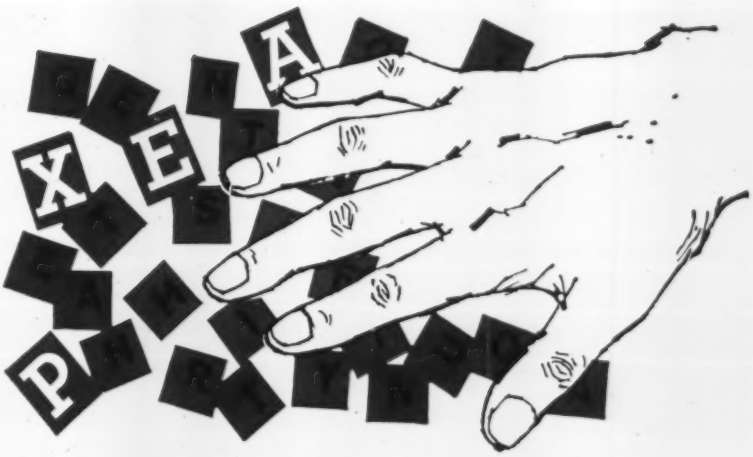
New business coming to pipe mills is being accepted on what some sellers call an open book basis (no specific shipment dates are specified, deliveries being subject to mills' convenience after production is resumed).

Some tubemaking capacity has continued to operate during the strike. Last week, A. M. Byers Co. was able to arrange an extension of its contract with the union. That will enable the company to operate throughout August at least, and it may be able to get additional extensions. The agreement with the union reportedly contains certain retroactive provisions.

Generally, tubemakers anticipate strong demand during the closing months of the year. One important interest in Pittsburgh says if the strike lasts 60 days 100 per cent mill operations will be experienced throughout the fourth quarter.

Foreign producers are getting an increasingly large share of the west coast market for buttweld

Your product isn't complete...



...until all the components...

...are properly assembled!

Assembly is one of the most important of all production operations. An efficient, economical assembly operation can depend upon your choice of the right fasteners and the right fastening tools.

Once you've selected the types of fasteners best fitted to your applications, you can select the correct fastening tools from the complete Apex line. For most applications, simply make your choice from the thousands of Apex standard or magnetic nut running and screwdriving tools available from stock. For special applications, just ask Apex—the authority on fastening—for practical assistance in solving your problems.

Write, on your company letterhead please, for

CATALOG 30-A—Nut Running Tools (up to 5/8" sq. dr.)
CATALOG 30-B—Nut Running Tools (3/4" to 3 1/2" sq. dr.)
CATALOG 30-C—Screwdriving Tools
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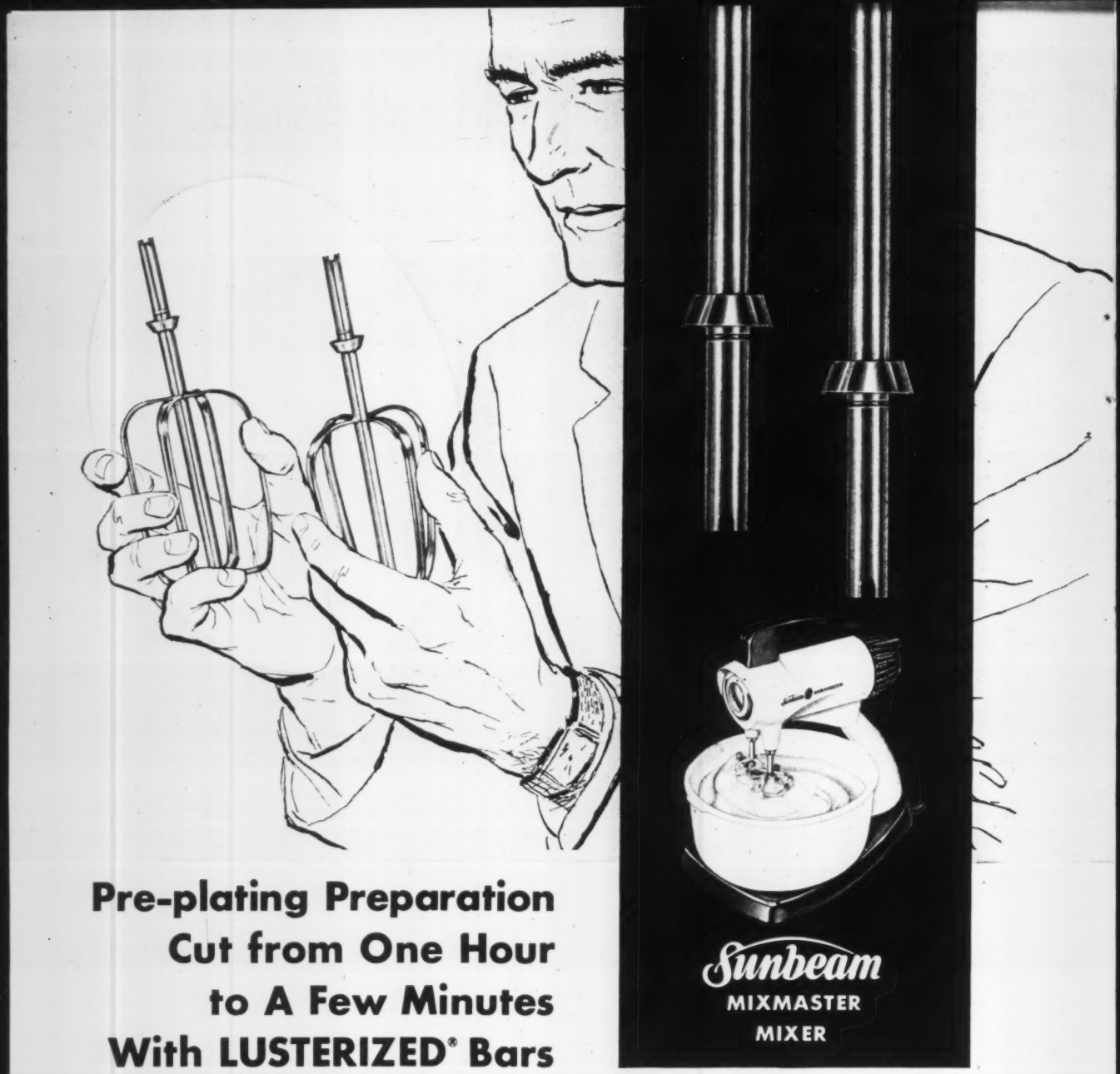
APEX FASTENING TOOLS

SCREWDRIVING • NUT RUNNING • SPECIAL



Pre-plating Preparation Cut from One Hour to A Few Minutes With LUSTERIZED® Bars

For as long as many can remember, the trademark Mixmaster has been the symbol of a quality, dependable household mixer. The pioneer producer of this type of popular kitchen appliance, Sunbeam has always insisted on the best materials and meticulous workmanship.

No little attention is given to attaining the highest quality chrome plating on the beater shafts, for example. The chrome must be smooth, free of pits where food might accumulate, and remain bright over years of hard use. To accomplish this, burnishing the cold finished steel bars formerly used for one hour was necessary in order to bring the bars up to the pre-plating brightness and smoothness required.

This expensive, time-consuming operation has been reduced to only a few minutes since Bliss & Laughlin's Lusterized cold finished steel bars have been used. That's because dulling, gritty processing contaminants, oils and lime are removed at the mill by Bliss & Laughlin's exclusive, patented finishing process. The close tolerances characteristic of Bliss & Laughlin production enable Sunbeam to count on a consistently tight fit of the shafts at the beater bearings, which minimizes vibration.

Ask us to show you how your production can benefit from the tangible quality and cost-saving advantages of specifying "Bliss & Laughlin Lusterized Finish"—the big difference in cold finished steel bars. Standard prices apply!

Originators of LUSTERIZED® Finish—The BIG DIFFERENCE in Cold Drawn Steel Bars

BLISS & LAUGHLIN

GENERAL OFFICES: Harvey, Ill. • PLANTS: Harvey, Detroit, Buffalo, Mansfield, Mass.

Largest Independent Producer of Cold Finished Steel Bars

pipe. Trade estimates place it at about 39 per cent.

Distributors . . .

Prices, Page 178

Distributors report a pickup in inquiries reflecting a gradual pinch on the inventories of some consumers who did not prepare adequately for the strike. The majority of steel users report their inventory positions remain comfortable. Most say their needs are well covered through this month.

General manufacturing demand for bars, sheets, and strip is expected to pick up as the vacation season wanes. This being the height of the construction season, steel service centers not closed by the strike are moving building steel products steadily. Greatest demand seems to be galvanized sheets which have been on a quota basis for several weeks in most districts.

Service centers don't look for much of a bulge in buying from other than their regular customers unless the strike is so prolonged serious gaps begin to appear in consumers' inventories.

Plates . . .

Plate Prices, Page 173

While demand for plates is slow compared with that for sheets and bars, a fairly steady flow of inquiries and orders is reported. New business is being accepted on the basis that shipments will be made at the convenience of producers.

The mills had booked a substantial tonnage for third quarter delivery before the strike was called and they had some carryover from the second quarter. These commitments will get preference in rolling schedules when production is resumed.

Consumers' stock are sufficient for the present. Most observers think they'll support fabricating operations through August at least and possibly beyond. However, when holes do begin to appear in inventories, a rush for position in fourth quarter schedules is certain to develop. That will probably be in September.

The longer the strike continues, the more certain it becomes that the fourth quarter will be the most active period of the year. A mill executive says that if the walkout continues for 60 days, steelmaking operations will be pushed close to capacity in the fourth quarter. Even then, deliveries may not meet buyers' requirements, since the pileup of orders for the last three months of the year is bound to make for delivery delays.

Lukens Steel Co., Coatesville, Pa., has been closed by the strike since Aug. 1 when negotiations for an extension of its labor contract failed.

Another important platemaker, Alan Wood Steel Co., Conshohocken, Pa., whose contract with the union was due to expire at the end of July, has negotiated an extension calling for agreement within 30 days after settlement by U. S. Steel Corp. Due to the fact that negotiations continued until the last minute, the company had started to bank its two blast furnaces and suspend open hearth operations. However, production was virtually back to normal on Aug. 4.

Tin Plate . . .

Tin Plate Prices, Page 175

Although tin plate production has been sharply curtailed by the strike (several mills continue to operate), there is yet no sign of supply hardship on the part of consumers. Most buyers likely will be able to get along with the stocks they have on hand until well into September. Some holes in supplies may begin to appear then, but no acute shortages are foreseen unless the mill shutdown extends well into the fall months—which few in the industry think will be the case.

Few mills are accepting firm commitments for fourth quarter delivery. They had some unshipped tonnage when the strike was called and that tonnage will get preference in shipping schedules when the mills get back to work. New bookings will be fitted into schedules as circumstances permit after the strike.

Chicago is the hub of a five state section that last year produced almost 29 per cent (about 11.5 billion) of the nation's 41.5 billion cans. The area (Illinois, Wisconsin, Indiana, Michigan, and Ohio) registered a gain of nearly 475 million cans over 1957 production. The figures were compiled by American Can Co., New York.

Canmaking plants in California, Washington, Oregon, and Hawaii turned out more cans in 1958 for fruits, vegetables, and juices than any other section of the country. The Pacific Coast states also led in fish can output, producing over 72 per cent of the nation's total.

Canmaking plants in eastern states combined to lead the nation in production of cans for coffee and carbonated beverages.

Pig Iron . . .

Pig Iron Prices, Page 178

Movement of merchant pig iron is expected to increase slightly this month. Several foundries which closed for vacations during the latter part of July have resumed production. Demand is further augmented by the decision of some melters to lay in extra reserve stocks in view of prospects for a prolonged strike at the furnaces.

The pig iron supply outlook brightened considerably in the East when Alan Wood Steel Co. was able to get its two blast furnaces at Swedeland, Pa., back to normal operations after a suspension of only a few days. An agreement for an extension of its labor contract was obtained after shutdown operations had gotten underway. The contract originally was due to expire at midnight July 31. It will not expire now until 30 days after a settlement is reached between the union and U. S. Steel Corp.

Foundries are increasing the amount of cast scrap in their melts in an effort to conserve pig iron supplies.

Look for a heavy movement of merchant iron on the Great Lakes as soon as the steel strike is ended. Consumers will be anxious to replenish their iron stocks during the balance of the shipping season to carry them over the winter months.

Iron Ore . . .

Iron Ore Prices, Page 179

Shipments of Lake Superior ore declined to only 6,845,309 tons in July from 12,987,302 tons in the preceding month as a result of the steel strike. The movement was 2,744,127 tons less than a year ago when 9,589,436 tons were shipped, reports the American Iron Ore Association.

Cumulative shipments for the season to Aug. 1 came to 35,577,842 tons, an increase of 13,824,272 tons

over the 21,753,570 tons for the like period a year ago.

Refractories . . .

Metallurgical Coke Prices, Page 179

E. J. Lavino & Co., Philadelphia, last week announced it will build a basic refractories plant in Gary, Ind., on 32 acres recently purchased.

Clearing and filling of the land are underway.

The company has a basic refractories plant at Plymouth Meeting, Pa., and another at Newark, Calif. The new midwest plant will round out its locations close to all the major steel and other metal producing areas.

Canada . . .

Recurring delays in downbound traffic on the Welland Canal are adding to the worries of basic steel producers in Hamilton, Ont., whose sources of iron ore at Mesabi have been cut off by the steel strike in the U. S.

About 30 vessels were tied up recently at Port Colborne waiting to be cleared through the canal. Priorities arranged for the movement of vital cargoes mean that every other ship must be an ore, coal, or grain carrier.

Each delay lops off some of the precious time left for Steel Company of Canada and Dominion Foundries & Steel to stockpile next winter's supplies of iron ore and coal.

Several of the giant lake carriers unloaded cargoes of coal here last week. Rather than make the long run light to Seven Islands for Labrador ore, they steamed up to Ft. William for cargoes of wheat.

Each hour lost waiting to be locked through the Welland Canal will mean that much delay on the movement of ore from Seven Islands and, inevitably, rising costs.

As a result, officials at both Stelco and Dofasco have to make corrections each day on the charts which project ore and coal deliveries during the balance of navigation.

Foreign Steel Importers Form Information Unit

Los Angeles area brokers handling steel produced abroad have established a public information committee. Their action followed a spurt in business induced by the steel strike. The committee is headed by Al Perrish, Winter Wolff & Co. Other members are: Willis Haines, Summit Lumber Co.; Harry Hatch, H. L. E. Meyer Co.; and Duane Erickson, Tricon Inc. Mr. Perrish is also president of the West Coast Metal Importers Association, composed of representatives of more than 25 firms engaged in steel importing.

Structural Shapes . . .

Structural Shape Prices, Page 173

Contractors report their near term needs are well covered on structural required for buildings, bridges, highways, and other public projects. However, there are some instances where certain phases of projects are being bypassed or delayed for lack of steel. The uncertain supply situation for later in the year may have an adverse effect on construction not under contract. Consensus in the industry is that the lag in activity probably will be of short duration.

Availability of Canadian and European steel is expected to help relieve serious shortages should the strike drag on for a long period. Some European steel already has moved into eastern centers, including Buffalo, since the strike began. Other shipments have been booked.

Canadian mills can provide a fair amount of steel for the U. S. market if the need arises. Thus far, there has been no bulge in Canadian mill operations as a result of an influx of orders from users in the states.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3400 tons, state bridge, Route 80, over Passaic River, near Paterson, N. J., through Public Constructors Inc., Blackwood, N. J., to Phoenix Bridge Co., a subsidiary of Phoenix Steel Corp., Phoenixville, Pa.

STRUCTURAL STEEL PENDING

3250 tons, Jones Falls Expressway, Sec. 1G, Baltimore; J. Richard Nissley, Landisville, Pa., low on general contract.

856 tons, state highway project 34-81, Danbury, Conn.; L. G. DeFelice & Son, North Haven, Conn., low on general contract. (This is a correction of an item previously reported.)

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago & North Western, 150 all-steel caboose cars, to Thrall Car Mfg. Co., Chicago Heights, Ill.

DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

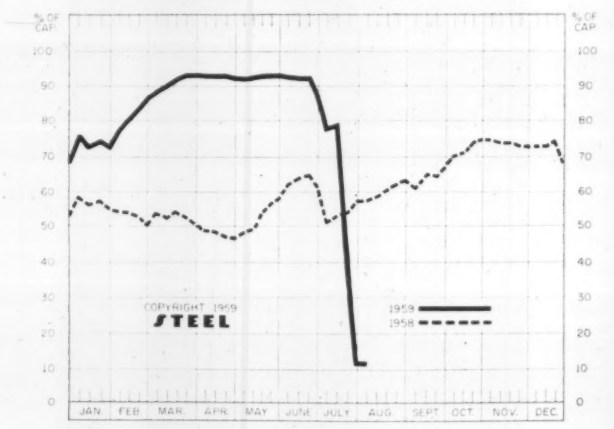
	Week Ended Aug. 9	Change	Same Week 1958	Same Week 1957
Pittsburgh	2	0	50	82
Chicago	5.5	0	67	85.5
Eastern	9	— 2	60	86
Youngstown	9	0	52	81
Wheeling	52	+ 1	73.5	87
Cleveland	6	0	53.5	87
Buffalo	4	0	51.5	88
Birmingham	9	0	54.5	85.5
Cincinnati	57.5	— 2.5*	42.5	73
St. Louis	52	— 1*	90	85.5
Detroit	24	+ 0.5*	68.5	54
Western	5	0	68	98
National Rate	12	— 0.2*	59	79

INGOT PRODUCTION

	Week Ended Aug. 9	Week Ago	Month Ago	Year Ago
INDEX (1947-49=100)	20.7†	21.5	140.2	98.7
NET TONS (In thousands)	340†	345	2,252	1,586

*Change from preceding week's revised rate.
†Estimated by STEEL; comparative figures reported by AISI.
Weekly capacity (net tons): 2,831,331 in 1959; 2,699,173 in 1958; 2,559,490 in 1957.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites

Aug. 4, 1959	Week Ago	Month Ago	July Avg.	Year Ago
186.7	**186.7**	**186.7**	**186.7**	**185.1**

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Aug. 4

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.385
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.615
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.905
Pipe, Galv., Buttweld (100 ft)	23.253
Pipe, Line (100 ft)	199.533
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.967
Nails, Wire, 8d Common	9.825
Wire, Barbed (80-rod spool)	8.722
Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Aug. 5 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	246.65	195.87
Index in cents per lb	6.713	6.713	6.713	6.682	5.306

STEEL's ARITHMETICAL COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.28	$117.64
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	38.33	38.67	38.00	42.00	28.50

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Aug. 5 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.F., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.425
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.00
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.60-5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	5.85
Tin plate (1.50 lb)box,Pitts.	$10.65	$10.65	$10.65	$10.30	$8.95

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$96.00	$78.00
Wire rods ⅜-⅝" Pitts.	6.40	6.40	6.40	6.15	4.675

PIG IRON, Gross Ton	Aug. 5 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, NevilleIsland,Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	60.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry(Birm.)deld., Cin.	70.20	70.20	70.20	70.20	60.43
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	200.00

†74-76% Mn, Duquesne, Pa.

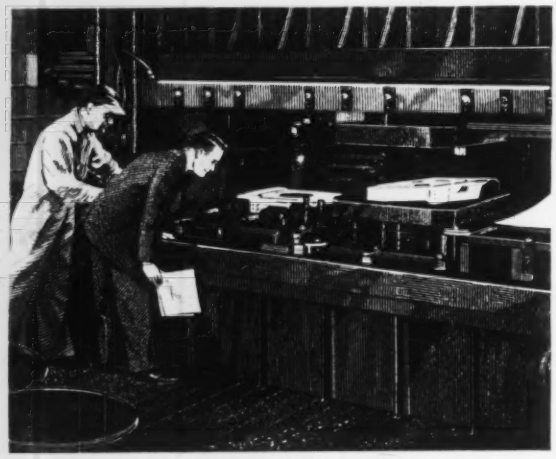
SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$38.50	$39.50	$39.50	$44.50	$29.50
No. 1 Heavy Melt, E. Pa.	40.00	40.00	38.00	38.00	26.00
No. 1 Heavy Melt, Chicago	36.50	36.50	36.50	43.50	30.00
No. 1 Heavy Melt, Valley	41.50	41.50	41.50	43.50	29.50
No. 1 Heavy Melt, Cleve.	38.50	38.50	38.50	40.00	27.50
No. 1 Heavy Melt, Buffalo	33.50	33.50	33.50	34.50	26.50
Rails, Rerolling, Chicago	59.50	59.50	59.50	64.50	44.50
No. 1 Cast, Chicago	52.50	52.50	52.50	45.50	35.50

COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.25	$14.75
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	30.50	25.25

To the Executive Concerned with Rising Costs and Competitive Pressures . . .

Are Clad-Rex® Vinyl-Metal Laminates too good to be true?

Almost, but not quite. Because Clad-Rex vinyl-metal laminates *are* real. And the way Clad-Rex substantially improves your manufacturing costs and product sales appeal is *just as real.*



Many other manufacturing executives are already proving the value of Clad-Rex in their operations. This is what they have learned . . .

Specifically, Clad-Rex is a calendered, semi-rigid poly-vinyl chloride film laminated to sheet metal. All alloys and tempers of aluminum and steel (including galvanized and aluminized) are commonly used. Other metals can be used where their special properties are important to end-product performance.

Incidentally, the words *calendered, semi-rigid, laminated,* etc., are very important. They're the characteristics that make Clad-Rex able to do what it *will do* for you, too.

Briefly—

Clad-Rex gives unlimited styling. Simulated woodgrains, leathers, as well as a wide variety of colors, patterns, and textures in sparkling burnishes including high metallics, or non-reflective mattes. You can even design your own, if you prefer!

Clad-Rex simplifies manufacturing operations. It's "finished" before you get it. Movement of sub-assemblies, etc., through your plant actually becomes more direct—out of your dies into assembly.

Clad-Rex lowers end product cost. Although Clad-Rex costs more coming into your plant, elimination of much expensive handling, finishing, and refinishing adds up to *less cost* by the time your product is ready to ship. Clad-Rex resistance to abrasion often eliminates the rejects common to *un*finished or some other prefinished metals. This includes the costly efforts to salvage rejects, of course.

That's it! Except for many other Clad-Rex advantages, such as the high dielectric strength, inherent resistance to corrosion, etc., that is common to calendered, semi-rigid poly-vinyl chloride film.

It's worth looking into. Particularly when you realize Clad-Rex can be fabricated in almost as many ways as any *un*finished sheet metal. *And,* your existing tooling can be used including forming dies in most cases. Clad-Rex even provides a Field Fabricating Engineer to show your production people how easy it is to get into production.

So, see for yourself. Write and ask for details on Clad-Rex. No obligation, of course.

VINYL-METAL LAMINATES BY **CLAD-REX** DIVISION OF SIMONIZ COMPANY

2105 Indiana Avenue • Chicago 16, Illinois

Telephone: VIctory 2-7272

2-A

Steel Prices

Mill prices as reported to STEEL, Aug. 5, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 174; footnotes, page 176.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ..... $76.00

INGOTS, Alloy (NT)
Detroit S41 ..... $82.00
Economy,Pa. B14 ..... 82.00
Farrell,Pa. S3 ..... 82.00
Lowellville,O. S3 ..... 82.00
Midland,Pa. C18 ..... 82.00
Munhall,Pa. U5 ..... 82.00
Sharon,Pa. S3 ..... 82.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)
Bartonville,Ill. K4 ... $82.00
Bessemer,Pa. U5 ..... 80.00
Buffalo R2 ..... 80.00
Clairton,Pa. U5 ..... 80.00
Ensley,Ala. T2 ..... 80.00
Fairfield,Ala. T2 ..... 80.00
Fontana,Calif. K1 ..... 90.50
Gary,Ind. U5 ..... 80.00
Johnstown,Pa. B2 ..... 80.00
Lackawanna,N.Y. B2 .. 80.00
Munhall,Pa. U5 ..... 80.00
Owensboro,Ky. G8 ..... 80.00
S.Chicago,Ill. R2, U5 .. 80.00
S.Duquesne,Pa. U5 ..... 80.00
Sterling,Ill. N15 ..... 80.00
Youngstown R2 ..... 80.00

Carbon, Forging (NT)
Bessemer, Pa. U5 .... $99.50
Buffalo R2 ..... 99.50
Canton,O. R2 ..... 102.00
Clairton, Pa. U5 ..... 99.50
Conshohocken,Pa. A3 .. 104.50
Ensley,Ala. T2 ..... 99.50
Fairfield,Ala. T2 ..... 99.50
Farrell,Pa. S3 ..... 99.50
Fontana,Calif. K1 .... 109.00
Gary,Ind. U5 ..... 99.50
Geneva,Utah C11 ..... 99.50
Houston S5 ..... 104.50
Johnstown,Pa. B2 ..... 99.50
Lackawanna,N.Y. B2 .. 99.50
LosAngeles B3 ..... 109.00
Midland,Pa. C18 ..... 99.50
Munhall,Pa. U5 ..... 99.50
Owensboro,Ky. G8 ..... 99.50
Seattle B3 ..... 109.00
Sharon,Pa. S3 ..... 99.50
S.Chicago R2, U5, W14 .. 99.50
S.Duquesne,Pa. U5 ..... 99.50
S.SanFrancisco B3 .... 109.00
Warren,O. C17 ..... 99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 .. $119.00
Bridgeport,Conn. C32 .. 119.00
Buffalo R2 ..... 119.00
Canton,O. R2, T7 .... 119.00
Conshohocken,Pa. A3 .. 126.00
Detroit S41 ..... 119.00
Economy,Pa. B14 .... 119.00
Farrell,Pa. S3 ..... 119.00
Fontana,Calif. K1 .... 140.00
Gary,Ind. U5 ..... 119.00
Houston S5 ..... 124.00
Ind.Harbor,Ind. Y1 .. 119.00
Johnstown,Pa. B2 .... 119.00
Lackawanna,N.Y. B2 .. 119.00
LosAngeles B3 ..... 139.00
Lowellville,O. S3 .... 119.00
Massillon,O. R2 ..... 119.00
Midland,Pa. C18 .... 119.00
Munhall,Pa. U5 ..... 119.00
Owensboro,Ky. G8 .. 119.00
Sharon,Pa. S3 ..... 119.00
S.Chicago R2,U5,W14 .. 119.00
S.Duquesne,Pa. U5 .. 119.00
Struthers,O. Y1 ..... 119.00
Warren,O. C17 ..... 119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ..... $122.50
Canton,O. R2 ..... 125.00
Cleveland R2 ..... 122.50
Gary,Ind. U5 ..... 122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 .. 122.50
Warren,O. C17 ..... 122.50

SKELP
Aliquippa,Pa. J5 ..... 5.05
Munhall,Pa. U5 ..... 5.05
Pittsburgh J5 ..... 5.05
Warren,O. R2 ..... 5.05
Youngstown R2, U5 .... 5.05

WIRE RODS
AlabamaCity,Ala. R2 .. 6.40
Aliquippa,Pa. J5 ..... 6.40
Alton,Ill. L1 ..... 6.60
Bartonville,Ill. K4 .... 6.50
Buffalo W12 ..... 6.40
Cleveland A7 ..... 6.40
Donora,Pa. A7 ..... 6.40
Fairfield,Ala. T2 ..... 6.40
Houston S5 ..... 6.65
IndianaHarbor,Ind. Y1 .. 6.40
Johnstown,Pa. B2 ..... 6.40
Joliet,Ill. A7 ..... 6.40
KansasCity,Mo. S5 .... 6.65
Kokomo,Ind. C16 ..... 6.50
LosAngeles B3 ..... 7.20
Minnequa,Colo. C10 .... 6.65
Monessen,Pa. P7 ..... 6.40
Pittsburg,Calif. C11 .... 7.20
Portsmouth,O. P12 .... 6.40
Roebling,N.J. R5 ..... 6.50
S.Chicago,Ill. R2, W14 .. 6.40
SparrowsPoint,Md. B2 .. 6.50
Sterling,Ill.(1) N15 .... 6.40
Sterling,Ill. N15 ..... 6.50
Struthers,O. Y1 ..... 6.40
Worcester,Mass. A7 .... 6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 .. 5.50
Aliquippa,Pa. J5 ..... 5.50
Atlanta A11 ..... 5.70
Bessemer,Ala. T2 ..... 5.50
Bethlehem,Pa. B2 ..... 5.55
Birmingham C15 ..... 5.50
Clairton,Pa. U5 ..... 5.50
Fairfield,Ala. T2 ..... 5.50
Fontana,Calif. K1 ..... 6.30
Gary,Ind. U5 ..... 5.50
Geneva,Utah C11 ..... 5.50
Houston S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1 .. 5.50
Johnstown,Pa. B2 ..... 5.55
Joliet,Ill. P22 ..... 5.50
KansasCity,Mo. S5 .... 5.60
Lackawanna,N.Y. B2 .. 5.55
LosAngeles B3 ..... 6.20
Minnequa,Colo. C10 .... 5.80
Munhall,Pa. U5 ..... 5.50
Niles,Calif. P1 ..... 6.25
Phoenixville,Pa. P4 .... 5.55
Portland,Oreg. O4 .... 6.25
Seattle B3 ..... 6.25
S.Chicago,Ill. U5, W14 .. 5.50
S.SanFrancisco B3 .... 6.15
Sterling,Ill. N15 ..... 5.50
Torrance Calif. C11 .... 6.20
Weirton,W.Va. W6 .... 5.50

Wide Flange
Bethlehem,Pa. B2 ..... 5.55
Clairton,Pa. U5 ..... 5.50
Fontana,Calif. K1 .... 6.45
IndianaHarbor,Ind. I-2 .. 5.50
Lackawanna,N.Y. B2 .. 5.55
Munhall,Pa. U5 ..... 5.50
Phoenixville,Pa. P4 .... 5.55
S.Chicago,Ill. U5 ..... 5.50
Sterling,Ill. N15 ..... 5.50
Weirton,W.Va. W6 .... 5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 6.90
Munhall,Pa. U5 ..... 6.80
S.Chicago,Ill. U5, W14 .. 6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ..... 8.05
Bessemer,Ala. T2 ..... 8.05
Bethlehem,Pa. B2 ..... 8.10
Clairton,Pa. U5 ..... 8.05
Fairfield,Ala. T2 ..... 8.05
Fontana,Calif. K1 ..... 8.85
Gary,Ind. U5 ..... 8.05
Geneva,Utah C11 ..... 8.05
Houston S5 ..... 8.15
Ind.Harbor,Ind. I-2, Y1 .. 8.05
Johnstown,Pa. B2 ..... 8.10
KansasCity,Mo. S5 .... 8.15
Lackawanna,N.Y. B2 .. 8.10
LosAngeles B3 ..... 8.75
Munhall,Pa. U5 ..... 8.05
Seattle B3 ..... 8.80
S.Chicago,Ill. U5, W14 .. 8.05
S.SanFrancisco B3 .... 8.70
Sterling,Ill. N15 ..... 7.75
Struthers,O. Y1 ..... 8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ..... 8.10
Ind.Harbor,Ind. I-2 .... 8.05
Lackawanna,N.Y. B2 .. 8.10
Munhall,Pa. U5 ..... 8.05
S.Chicago,Ill. U5 ..... 8.05
Sterling,Ill. N15 ..... 7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ..... 5.55
Ind.Harbor,Ind. I-2 .... 5.50
Lackawanna,N.Y. B2 .. 5.55
Munhall,Pa. U5 ..... 5.50
S.Chicago,Ill. I-2, U5 .. 5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 .... 6.50
Lackawanna,N.Y. B2 .. 6.50
Munhall,Pa. U5 ..... 6.50
S.Chicago,Ill. I-2, U5 .. 6.50
Weirton,W.Va. W6 .... 6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 .. 5.30
Aliquippa,Pa. J5 ..... 5.30
Ashland,Ky.(15) A10 .. 5.30
Atlanta A11 ..... 5.50
Bessemer,Ala. T2 ..... 5.30
Clairton,Pa. U5 ..... 5.30
Claymont,Del. C22 .... 5.30
Cleveland J5, R2 ..... 5.30
Coatesville,Pa. L7 ..... 5.30
Conshohocken,Pa. A3 .. 5.30
Ecorse,Mich. G5 ..... 5.30
Fairfield,Ala. T2 ..... 5.30
Farrell,Pa. S3 ..... 5.30
Fontana,Calif.(30) K1 .. 6.10
Gary,Ind. U5 ..... 5.30
Geneva,Utah C11 ..... 5.30
GraniteCity,Ill. G4 .... 5.40
Harrisburg,Pa. P4 ..... 5.30
Houston S5 ..... 5.40
Ind.Harbor,Ind. I-2, Y1 .. 5.30
Johnstown,Pa. B2 ..... 5.30
Lackawanna,N.Y. B2 .. 5.30
Mansfield,O. E6 ..... 5.30
Minnequa,Colo. C10 .... 6.15
Munhall,Pa. U5 ..... 5.30
Newport,Ky. A2 ..... 5.30
Pittsburgh J5 ..... 5.30
Riverdale,Ill. A1 ..... 5.30
Seattle B3 ..... 6.20
Sharon,Pa. S3 ..... 5.30
S.Chicago,Ill. U5, W14 .. 5.30
SparrowsPoint,Md. B2 .. 5.30
Sterling,Ill. N15 ..... 5.30
Steubenville,O. W10 .... 5.30
Warren,O. R2 ..... 5.30
Youngstown U5, Y1 .... 5.30
Youngstown (27) R2 .. 5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 .... 7.05
Fontana,Calif. K1 .... 7.85
Geneva,Utah C11 ..... 7.05
Houston S5 ..... 7.15
Johnstown,Pa. B2 ..... 7.05
SparrowsPoint,Md. B2 .. 7.05

PLATES, Wrought Iron
Economy,Pa. B14 .... 13.55

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ..... 7.95
Ashland,Ky. A10 ..... 7.95
Bessemer,Ala. T2 ..... 7.95
Clairton,Pa. U5 ..... 7.95
Claymont,Del. C22 .... 7.95
Cleveland J5, R2 ..... 7.95
Coatesville,Pa. L7 ..... 7.95
Conshohocken,Pa. A3 .. 7.95
Economy,Pa. B14 ..... 7.95
Ecorse,Mich. G5 ..... 7.95
Fairfield,Ala. T2 ..... 7.95
Farrell,Pa. S3 ..... 7.95
Fontana,Calif.(30) K1 .. 8.75
Gary,Ind. U5 ..... 7.95
Geneva,Utah C11 ..... 7.95
Houston S5 ..... 8.05
Ind.Harbor,Ind. I-2, Y1 .. 7.95
Johnstown,Pa. B2 ..... 7.95
Munhall,Pa. U5 ..... 7.95
Pittsburgh J5 ..... 7.95
Seattle B3 ..... 8.85
Sharon,Pa. S3 ..... 7.95
S.Chicago,Ill. U5, W14 .. 7.95
SparrowsPoint,Md. B2 .. 7.95
Warren,O. R2 ..... 7.95
Youngstown U5, Y1 .... 7.95

PLATES, Alloy
Aliquippa,Pa. J5 ..... 7.50
Claymont,Del. C22 .... 7.50
Coatesville,Pa. L7 ..... 7.50
Economy,Pa. B14 ..... 7.50
Farrell,Pa. S3 ..... 7.50
Fontana,Calif. K1 ..... 8.30
Gary,Ind. U5 ..... 7.50
Houston S5 ..... 7.60
Ind.Harbor,Ind. Y1 .... 7.50
Johnstown,Pa. B2 ..... 7.50
Lowellville,O. S3 ..... 7.50
Munhall,Pa. U5 ..... 7.50
Newport,Ky. A2 ..... 7.50
Pittsburgh J5 ..... 7.50
Seattle B3 ..... 8.40
Sharon,Pa. S3 ..... 7.50
S.Chicago,Ill. U5, W14 .. 7.50
SparrowsPoint,Md. B2 .. 7.50
Youngstown Y1 ..... 7.50

FLOOR PLATES
Cleveland J5 ..... 6.375
Conshohocken,Pa. A3 .. 6.375
Ind.Harbor,Ind. I-2 .... 6.375
Munhall,Pa. U5 ..... 6.375
Pittsburgh J5 ..... 6.375
S.Chicago,Ill. U5 ..... 6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 .. 5.55
Ashland l.c.l.(15) A10 .. 6.05
Cleveland c.l. R2 ..... 6.05
Warren,O. c.l. R2 ..... 6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 .. 5.675
Aliquippa,Pa. (9) J5 .. 5.675
Alton,Ill. L1 ..... 5.875
Atlanta (9) A11 ..... 5.875
Bessemer,Ala.(9) T2 .. 5.675
Birmingham(9) C15 .. 5.675
Buffalo(9) R2 ..... 5.675
Canton,O. (23) R2 ..... 6.15
Clairton,Pa.(9) U5 .. 5.675
Cleveland(9) R2 ..... 5.675
Ecorse,Mich.(9) G5 .. 5.675
Emeryville,Calif. J7 .. 6.425
Fairfield,Ala.(9) T2 .. 5.675
Fairless,Pa.(9) U5 .. 5.825
Fontana,Calif.(9) K1 .. 6.375
Gary,Ind.(9) U5 ..... 5.675
Houston(9) S5 ..... 5.925
Ind.Harbor(9) I-2, Y1 .. 5.675
Johnstown,Pa.(9) B2 .. 5.675
Joliet,Ill. P22 ..... 5.675
KansasCity,Mo.(9) S5 .. 5.925
Lackawanna(9) B2 ..... 5.675
LosAngeles(9) B3 ..... 6.375
Massillon,O. (23) R2 .. 6.15
Midland,Pa.(23) C18 .. 6.025
Milton,Pa. M18 ..... 5.825
Minnequa,Colo. C10 .... 6.125
Niles,Calif. P1 ..... 6.375
Owensboro,Ky.(9) G8 .. 6.025
Pittsburg,Calif.(9) C11 .. 6.375
Pittsburgh(9) J5 ..... 5.675
Portland,Oreg. O4 .... 6.425
Riverdale,Ill.(9) A1 .. 5.675
Seattle A24, B3 N14 .. 6.425
S.Ch'e'go(9)R2,U5,W14 .. 5.675
S.Duquesne,Pa.(9) U5 .. 5.675
S.SanFran.,Calif.(9)B3 .. 6.425
Sterling,Ill.(1)(9) N15 .. 5.675
Sterling,Ill.(9) N15 .... 5.775
Struthers,O.(9) Y1 ..... 5.675
Tonawanda,N.Y. B12 .. 5.675
Torrance,Calif.(9) C11 .. 6.375
Warren,O. C17 ..... 6.025
Youngstown(9) R2, U5 .. 5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.725
Bethlehem,Pa. B2 .... 6.725
Bridgeport,Conn. C32 .. 6.80
Buffalo R2 ..... 6.725
Canton,O. R2, T7 .... 6.725
Clairton,Pa. U5 ..... 6.725
Detroit S41 ..... 6.725
Economy,Pa. B14 .... 6.725
Ecorse,Mich. G5 ..... 6.725
Fairless,Pa. U5 ..... 6.875
Farrell,Pa. S3 ..... 6.725
Fontana,Calif. K1 .... 7.775
Gary,Ind. U5 ..... 6.725
Houston S5 ..... 6.975
Ind.Harbor,Ind. I-2, Y1 .. 6.725
Johnstown,Pa. B2 .... 6.725
KansasCity,Mo. S5 .... 6.975
Lackawanna,N.Y. B2 .. 6.725
LosAngeles B3 ..... 7.775
Lowellville,O. S3 .... 6.725
Massillon,O. R2 ..... 6.725
Midland,Pa. C18 .... 6.725
Owensboro,Ky. G8 .... 6.725
Pittsburgh J5 ..... 6.725
Sharon,Pa. S3 ..... 6.725
S.Chicago R2, U5, W14 .. 6.725
S.Duquesne,Pa. U5 .... 6.725
Struthers,O. Y1 ..... 6.725
Warren,O. C17 ..... 6.725
Youngstown U5 ..... 6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ..... 8.30
Bessemer,Ala. T2 ..... 8.30
Bethlehem,Pa. B2 ..... 8.30
Clairton,Pa. U5 ..... 8.30
Cleveland R2 ..... 8.30
Ecorse,Mich. G5 ..... 8.30
FairfieldAla. T2 ..... 8.30
Fontana,Calif. K1 ..... 9.00
Gary,Ind. U5 ..... 8.30
Houston S5 ..... 8.55
Ind.Harbor,Ind. Y1 .... 8.30
Johnstown,Pa. B2 ..... 8.30
KansasCity,Mo. S5 .... 8.55
Lackawanna,N.Y. B2 .. 8.30
LosAngeles B3 ..... 9.00
Pittsburgh J5 ..... 8.30
Seattle B3 ..... 9.05
S.Chicago,Ill. R2, W14 .. 8.30
S.Duquesne,Pa. U5 .... 8.30
S.SanFrancisco B3 .... 9.05
Struthers,O. Y1 ..... 8.30
Youngstown U5 ..... 8.30

BAR SIZE ANGLES, H.R. Carbon
Bethlehem,Pa.(9) B2 .. 5.825
Houston(9) S5 ..... 5.925
KansasCity,Mo.(9)S5 .. 5.925
Lackawanna(9) B2 .... 5.675
Sterling,Ill. N15 ..... 5.775
Sterling,Ill.(1) N15 .. 5.675
Tonawanda,N.Y. B12 .. 5.675

BAR SIZE ANGLES, S. Shapes
Aliquippa,Pa. J5 ..... 5.675
Atlanta A11 ..... 5.875
Joliet,Ill. P22 ..... 5.675
Minnequa,Colo. C10 .... 6.125
Niles,Calif. P1 ..... 6.375
Pittsburgh J5 ..... 5.675
Portland,Oreg. O4 .... 6.425
SanFrancisco S7 ..... 6.52
Seattle B3 ..... 6.425

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 7.05
KansasCity,Mo. S5 .... 7.05
Pittsburgh J5 ..... 6.80
Youngstown U5 ..... 6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30 .. 11.75*

Alloy
Ambridge,Pa. W18 .. 10.175
BeaverFalls,Pa. M12 .. 10.175
Camden,N.J. P13 ..... 10.35
Chicago W18 ..... 10.175
Elyria,O. W8 ..... 10.175
Monaca,Pa. S17 ..... 10.175
Newark,N.J. W18 ..... 10.35
SpringCity,Pa. K3 ..... 10.35

*Grade A; add 0.05c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ..... 7.65
BeaverFalls,Pa. M12,R2 .. 7.65
Birmingham C15 ..... 8.25
Buffalo B5 ..... 7.70
Camden,N.J. P13 ..... 8.10
Carnegie,Pa. C12 ..... 7.65
Chicago W18 ..... 7.65
Cleveland A7, C20 .... 7.65
Detroit B5, P17 ..... 7.85
Detroit S41 ..... 7.65
Donora,Pa. A7 ..... 7.65
Elyria,O. W8 ..... 7.65
FranklinPark,Ill. N5 .. 7.65
Gary,Ind. R2 ..... 7.65
GreenBay,Wis. F7 ..... 7.65
Hammond,Ind. J5, L2 .. 7.65
Hartford,Conn. R2 .... 8.15
Harvey,Ill. B5 ..... 7.65
LosAngeles(49) S30 .... 9.10
LosAngeles(49) P2, R2 .. 9.10
Mansfield,Mass. B5 .... 8.20
Massillon,O. R2, R8 .. 7.65
Midland,Pa. C18 ..... 7.65
Monaca,Pa. S17 ..... 7.65
Newark,N.J. W18 ..... 8.10
NewCastle,Pa.(17) B4 .. 7.65
Pittsburgh J5 ..... 7.65
Plymouth,Mich. P5 .... 7.90
Putnam,Conn. W18 .... 8.20
Readville,Mass. C14 .... 8.20
S.Chicago,Ill. W14 .... 7.65
SpringCity,Pa. K3 .... 8.10
Struthers,O. Y1 ..... 7.65
Warren,O. C17 ..... 7.65
Waukegan,Ill. A7 ..... 7.65
Willimantic,Conn. J5 .. 8.15
Youngstown F3, Y1 .... 7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19 .. 6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .... 9.025
BeaverFalls,Pa.M12,R2 .. 9.025
Bethlehem,Pa. B2 ..... 9.025
Bridgeport,Conn. C32 .. 9.175
Buffalo B5 ..... 9.025
Camden,N.J. P13 ..... 9.20
Canton,O. T7 ..... 9.025
Carnegie,Pa. C12 ..... 9.025
Chicago W18 ..... 9.025
Cleveland A7, C20 .... 9.025
Detroit B5, P17 ..... 9.225
Detroit S41 ..... 9.025
Donora,Pa. A7 ..... 9.025
Elyria,O. W8 ..... 9.025
FranklinPark,Ill. N5 .. 9.025
Gary,Ind. R2 ..... 9.025
GreenBay,Wis. F7 ..... 9.025
Hammond,Ind. J5, L2 .. 9.025
Hartford,Conn. R2 .... 9.325
Harvey,Ill. B5 ..... 9.025
Lackawanna,N.Y. B2 .. 9.025
LosAngeles P2, S30 .. 11.00
Mansfield,Mass. B5 .... 9.325
Massillon,O. R2, R8 .. 9.025
Midland,Pa. C18 ..... 9.025
Monaca,Pa. S17 ..... 9.025
Newark,N.J. W18 ..... 9.20
Plymouth,Mich. P5 .... 9.225
S.Chicago,Ill. W14 .... 9.025
SpringCity,Pa. K3 ..... 9.20
Struthers,O. Y1 ..... 9.025
Warren,O. C17 ..... 9.025
Waukegan,Ill. A7 ..... 9.025
Willimantic,Conn. J5 .. 9.325
Worcester,Mass. A7 .... 9.325
Youngstown F3, Y1 .... 9.025

BARS, Reinforcing, Billet (To Fabricators)

Alabama City, Ala. R2 ..5.675
Atlanta A11 .....5.675
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse Mich. G5 .....5.675
Emeryville, Calif. J7 ...6.425
Fairfield, Ala. T2 .....5.675
Fairless, Pa. U5 .....5.825
Fontana, Calif. K1 ....6.375
Ft. Worth, Tex (4) (26) T4 5.925
Gary, Ind. U5 .....5.675
Houston S5 .....5.925
Ind. Harbor, Ind. I-2, Y1 5.675
Johnstown, Pa. B2 ....5.675
Joliet, Ill. P22 .....5.675
Kansas City, Mo. S5 ...5.925
Kokomo, Ind. C16 .....5.775
Lackawanna, N.Y. B2 ..5.675
Los Angeles B3 .....6.375
Madison, Ill. L1 .....5.875
Milton, Pa. M18 .....5.825
Minnequa, Colo. C10 ..6.125
Niles, Calif. P1 .....6.375
Pittsburg, Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland Ore. O4 ....6.425
Sand Springs, Okla. S5 ..5.925
Seattle A24 B3, N14 ..6.425
S. Chicago, Ill. R2, W14 5.675
S. Duquesne, Pa. U5 ...5.675
S. San Francisco B3 ....6.425
Sparrows Point, Md. B2..5.675
Sterling, Ill. (1) N15 ...5.675
Sterling Ill. N15 .....5.775
Struthers, O. Y1 .....5.675
Tonawanda, N. Y. B12 ..6.10
Torrance, Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown, Pa. B2 .....7.33
Kansas City, Mo. S5 ....7.60
Lackawanna, N.Y. B2 ..7.35
Marion, O. P11 .....6.70
Newark N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
Sand Springs, Okla. S5 ..7.60
Seattle A24, B3, N14 ..7.95
Sparrows Pt., Md. B2 ..7.33
St Paul U8 .....8.17
Williamsport Pa. S19 ..7.25

BARS, Wrought Iron

Economy, Pa. (S.R.) B14 14.90
Economy, Pa. (D.R.) B14 18.55
Economy (Staybolt) B14 19.00
McK. Rks. (S.R.) L5 ..14.50
McK. Rks. (D.R.) L5 ..19.80
McK. Rks. (Staybolt) L5 20.95

BARS, Rail Steel

Chicago Hts. (3) C2, I-2 5.575
Chicago Hts. (4) (44) I-2 5.675
Chicago Hts. (4) C2 ....5.675
Franklin, Pa. (3) F5 ..5.575
Franklin, Pa. (4) F5 ..5.675
Jersey Shore, Pa. (3) J8 ..5.55
Marion, O. (3) P11 .....5.575
Tonawanda (3) B12 ...5.575
Tonawanda (4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Alabama City, Ala. R2 ..5.10
Allenport, Pa. P7 .....5.10
Aliquippa, Pa. J5 .....5.10
Ashland, Ky. (8) A10 ..5.10
Cleveland J5, R2 .....5.10
Conshohocken Pa. A3 ..5.15
Detroit (8) M1 .....5.10
Ecorse, Mich. G5 .....5.10
Fairfield, Ala. T2 .....5.10
Fairless, Pa. U5 .....5.15
Farrell, Pa. S3 .....5.10
Fontana, Calif. K1 ....5.825
Gary, Ind. U5 .....5.10
Geneva, Utah C11 .....5.20
Granite City, Ill. (8) G4 ..5.20
Ind. Harbor, Ind. I-2, Y1 5.10
Irvin Pa. U5 .....5.10
Lackawanna, N.Y. B2 ..5.10
Mansfield, O. E6 .....5.10
Munhall, Pa. U5 .....5.10
Newport, Ky. A2 .....5.10
Niles, O. M21, S3 .....5.10
Pittsburg, Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth O. P12 ....5.10
Riverdale, Ill. A1 .....5.10
Sharon, Pa. S3 .....5.10
S. Chicago, Ill. U5, W14 ..5.10
Sparrows Point, Md. B2..5.10
Steubenville, O. W10 ....5.10
Warren, O. R2 .....5.10
Weirton, W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles, O. M21, S3 ....6.275

SHEETS, H.R., Alloy

Gary, Ind. U5 .....8.40
Ind. Harbor, Ind. Y1 ....8.40
Irvin, Pa. U5 .....8.40
Munhall, Pa. U5 .....8.40
Newport, Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa, Pa. J5 .....7.525
Ashland, Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken, Pa. A3 ..7.575
Ecorse, Mich. G5 .....7.525
Fairfield, Ala. T2 .....7.525
Fairless, Pa. U5 .....7.575
Farrell, Pa. S3 .....7.525
Fontana, Calif. K1 ....8.25
Gary, Ind. U5 .....7.525
Ind. Harbor, Ind. I-2, Y1 7.525
Irvin, Pa. U5 .....7.525
Lackawanna (35) B2 ..7.525
Munhall, Pa. U5 .....7.525
Niles, O. S3 .....7.525
Pittsburgh J5 .....7.525
S. Chicago, Ill. U5, W14 7.525
Sharon, Pa. S3 .....7.525
Sparrows Point (36) B2..7.525
Warren, O. R2 .....7.525
Weirton, W. Va. W6 ....7.525
Youngstown U5 Y1 ..7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland, Ky. (8) A10 ...5.35
Cleveland R2 .....5.875
Warren, O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown, O. A10 ....6.775
Warren, O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Alabama City, Ala. R2 .6.275
Aliquippa, Pa. J5 .....6.275
Allenport, Pa. P7 .....6.275
Cleveland J5, R2 ....6.275
Conshohocken, Pa. A3..6.325
Detroit M1 .....6.275
Ecorse, Mich. G5 .....6.275
Fairfield, Ala. T2 .....6.275
Fairless, Pa. U5 .....6.325
Follansbee, W.Va. F4 ..6.275
Fontana, Calif. K1 ....7.40
Gary, Ind. U5 .....6.275
Granite City, Ill. G4 ....6.375
Ind. Harbor, Ind. I-2, Y1 6.275
Irvin Pa. U5 .....6.275
Lackawanna, N.Y. B2..6.275
Mansfield, O. E6 .....6.275
Middletown, O. A10 ....6.275
Newport, Ky. A2 .....6.275
Pittsburg, Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth, O. P12 ....6.275
Sparrows Point, Md. B2..6.275
Steubenville, O. W10 ..6.275
Warren, O. R2 .....6.275
Weirton, W.Va. W6 ....6.275
Yorkville, O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa, Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse, Mich. G5 .....9.275
Fairless, Pa. U5 .....9.325
Fontana, Calif. K1 ....10.40
Gary, Ind. U5 .....9.275
Ind. Harbor, Ind. I-2, Y1 9.275
Lackawanna (37) B2 ..9.275
Pittsburgh J5 .....9.275
Sparrows Point (38) B2..9.275
Warren, O. R2 .....9.275
Weirton, W.Va. W6 ...9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala. City, Ala. R2	7.225	....
Ashland, Ky. A10	7.225	7.475
Canton, O. R2	7.225	7.75
Fairfield T2	7.225	7.475
Gary, Ind. U5	7.225	7.475
Granite City, Ill. G4	7.325	....
Ind. Harbor I-2	7.225	7.475
Irvin, Pa. U5	7.225	7.475
Kokomo Ind. C16	7.325	....
Martins Fry. W10	7.225	7.475
Pitts., Calif. C11	7.975	....
Pittsburgh J5	7.225	....
Sparrows Pt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind. Harbor, Ind. I-2 ...7.475

SHEETS, Galvanized Steel Hot-Dipped

Alabama City, Ala. R2 .6.875‡
Ashland, Ky. A10 ....6.875†
Canton, O. R2 .....6.875‡
Dover O. E6 .....6.875†
Fairfield, Ala. T2 ....6.875†
Gary Ind. U5 .....6.875†
Granite City, Ill. G4 ...6.975*
Ind. Harbor Ind. I-2 ..6.875†
Irvin Pa. U5 .....6.875†
Kokomo Ind. C16 ....6.975‡
Martins Ferry, O. W10 6.875*
Middletown, O. A10 ...6.875†
Pittsburg, Calif. C11 ...7.625*
Pittsburgh J5 .....6.875†
Sparrows Pt., Md. B2 ..6.875†
Warren, O. R2 .....6.875†
Weirton, W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana, Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin, Pa. U5 .....10.125
Pittsburgh J5 .....10.125
Sparrows Pt. (39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton, O. R2 .....7.275
Irvin, Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland, Ky. A10 ....7.125
Middletown, O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland (28) B2 .....7.65
Niles, O. (28) R2 .....7.65
Weirton, W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Aluminum Coated

Butler Pa. A10 (type 1) 9.525
Bulter, Pa. A10 (type 2) 9.625

SHEETS, Enameling Iron

Ashland, Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield, Ala. T2 ....6.775
Gary, Ind. U5 .....6.775
Granite City, Ill. G4 ....6.875
Ind. Harbor, Ind. I-2, Y1 6.775
Irvin, Pa. U5 .....6.775
Middletown, O. A10 ....6.775
Niles, O. M21, S3 ....6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover, O. E6 .....8.70
Follansbee, W.Va. F4 ...8.70
Ind. Harbor, Ind. I-2 ....8.70
Mansfield, O. E6 .....8.70
Warren, O. R2 .....8.70
Yorkville, O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

Beech Bottom W.Va. W10 7.225
Gary, Ind. U5 .....7.225
Mansfield, O. E6 .....7.225
Middletown, O. A10 ....7.225
Niles, O. M21, S3 .....7.225
Warren, O. R2 .....7.225
Weirton, W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laghlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Champan & Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S & W Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring Corp.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala. (27) R2	5.10
Allenport,Pa. P7	5.10
Alton,Ill. L1	5.30
Ashland,Ky.(8) A10	5.10
Atlanta A11	5.10
Bessemer,Ala. T2	5.10
Birmingham C15	5.10
Buffalo(27) R2	5.10
Conshohocken,Pa. A3	5.15
Detroit M1	5.10
Ecorse,Mich. G5	5.10
Fairfield Ala. T2	5.10
Farrell,Pa. S3	5.10
Fontana,Calif. K1	5.825
Gary,Ind. U5	5.10
Ind.Harbor,Ind. I-2, Y1	5.10
Johnstown,Pa.(25) B2	5.10
Lackaw'na,N.Y.(25) B2	5.10
LosAngeles(25) B3	5.85
LosAngeles C1	8.60
Minnequa,Colo. C10	6.20
Riverdale,Ill. A1	5.10
SanFrancisco S7	6.60
Seattle(25) B3	6.10
Seattle N14	6.60
Sharon,Pa. S3	5.10
S.Chicago,Ill. W14	5.10
S.SanFrancisco(25) B3	5.85
SparrowsPoint,Md. B2	5.10
Torrance,Calif. C11	5.85
Warren,O. R2	5.10
Weirton,W.Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.40
Farrell,Pa. S3	8.40
Gary,Ind. U5	8.40
Houston S5	8.65
Ind.Harbor Ind. Y1	8.40
KansasCity,Mo. S5	8.65
LosAngeles B3	9.60
Lowellville,O. S3	8.40
Newport,Ky. A2	8.40
Sharon,Pa. A2, S3	8.40
S.Chicago,Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10	7.575
Bessemer,Ala. T2	7.575
Conshohocken,Pa. A3	7.575
Ecorse,Mich. G5	7.575
Fairfield,Ala. T2	7.575
Farrell,Pa. S3	7.575
Gary,Ind. U5	7.575
Ind.Harbor,Ind. I-2, Y1	7.575
Lackawanna,N.Y. B2	7.575
LosAngeles(25) B3	8.325
Seattle(25) B3	8.575
Sharon,Pa. S3	7.575
S.Chicago Ill. W14	7.575
S.SanFrancisco(25) B3	8.325
SparrowsPoint,Md. B2	7.575
Warren,O. R2	7.575
Weirton,W.Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.35
Warren,O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn,Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover,O. G6	7.425
Evanston,Ill. M22	7.525
Farrell,Pa. S3	7.425
Follansbee,W.Va. W10	7.425
Fontana,Calif. K1	9.20
FranklinPark,Ill. T6	7.525
Ind.Harbor,Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport,Pa. E10	7.525
NewBedford,Mass. R10	7.875
NewBritain,Conn. S15	7.875
NewCastle,Pa. B4, E5	7.425
NewHaven,Conn. D2	7.875
NewKensington,Pa. A6	7.425
Pawtucket,R.I. R3	7.975
Pawtucket,R.I. N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale,Ill. A1	7.525
Rome,N.Y.(32) R6	7.425
Sharon,Pa. S3	7.425
Trenton,N.J.(31) R5	8.875
Wallingford,Conn. W2	7.875
Warren,O. R2, T5	7.425
Worcester,Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie,Pa. S18	15.55
Cleveland A7	15.55
Dover,O. G6	15.55
Farrell,Pa. S3	15.55
FranklinPark,Ill. T6	15.55
Harrison,N.J. C18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville,O. S3	15.55
Pawtucket,R.I. N8	15.90
Riverdale,Ill. A1	15.55
Sharon,Pa. S3	15.55
Worcester,Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn,Mich. S3	10.80
Dover,O. G6	10.80
Farrell,Pa. S3	10.80
Ind.Harbor,Ind. Y1	10.80
Sharon,Pa. S3	10.80
Warren,O. R2	10.80

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

Weirton,W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	8.175

STRIP, C.R. Electrogalvanized

Cleveland A7	7.425*
Dover,O. G6	7.425*
Evanston,Ill. M22	7.525*
McKeesport Pa. E10	7.50*
Riverdale,Ill. A1	7.525*
Warren,O. B9, S3, T5	7.425*
Worcester,Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3	7.50
Sharon,Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Farrell,Pa. S3	5.525
Riverdale,Ill. A1	5.675
Sharon,Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.60
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per lb)

IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....

TIN PLATE, American

	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Ind.Harb. Y1	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	7.85
Gary Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$10.05
Irvin,Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift,Pa. U5	8.10
Mansfield,O. E6	8.10
Warren,O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)

	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	18.10	19.70	20.20	20.70	15.70††	
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	8.00
Aliquippa,Pa. J5	8.00
Alton,Ill. L1	8.20
Atlanta A1	8.00
Bartonville Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville,Ind. M8	8.10
Donora,Pa. A7	8.00
Duluth A7	8.00
Fairfield,Ala. T2	8.00
Fostoria,O.(24) S1	8.10
Houston S5	8.25
Jacksonville,Fla. M8	8.35
Johnstown,Pa. B2	8.00
Joliet Ill. A7	8.00
KansasCity,Mo. S5	8.25
Kokomo,Ind. C16	8.10
LosAngeles B3	8.95
Minnequa,Colo. C10	8.25
Monessen,Pa. P7, P16	8.00
Palmer,Mass. W12	8.30
Pittsburg,Calif. C11	8.95
Portsmouth,O. P12	8.00
Rankin Pa. A7	8.00
S.Chicago,Ill. R2	8.00
S.SanFrancisco C10	8.95
SparrowsPoint,Md. B2	8.10
Sterling,Ill.(1) N15	8.00
Sterling,Ill. N15	8.10
Struthers,O. Y1	8.00
Waukegan,Ill. A7	8.00
Worcester,Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria,O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johntown,Pa. B2	13.40
KansasCity,Mo. U3	12.90
Minnequa,Colo. C10	12.775
Monessen,Pa. P7, P16	12.65
Muncie,Ind. I-7	13.60
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	13.70
Pittsburg Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling N.J. R5	12.95
SparrowsPt.,Md. B2	13.50
Struthers,O. Y1	13.40
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.75
Alton Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora,Pa. A7	9.75
Duluth A7	9.75
Johnstown,Pa. B2	9.75
KansasCity,Mo. S5, U3	10.00
LosAngeles B3	10.70
Minnequa,Colo. C10	9.95
Monessen,Pa. P7, P16	9.75
NewHaven,Conn. A7	10.05
Palmer,Mass. W12	10.05
Pittsburg Calif. C11	10.70
Portsmouth,O. P12	9.75
Roebling N.J. R5	10.05
S.Chicago,Ill. R2	9.75
S.SanFrancisco C10	10.70
SparrowsPt.,Md. B2	9.85
Struthers,O. Y1	9.75
Trenton,N.J. A7	10.05
Waukegan,Ill. A7	9.75
Worcester,Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1	16.50
Bartonville,Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville,Ind. M8	16.40
Fostoria,O. S1	16.30
Houston S5	16.55
Jacksonville,Fla. M8	16.65
Johnstown Pa. B2	16.30
KansasCity Mo. S5	16.55
Kokomo,Ind. C16	16.30
Minnequa,Colo. C10	16.55
Monessen,Pa. P16	16.30
Muncie,Ind. I-7	16.50
Palmer,Mass. W12	16.60
S.SanFrancisco C10	17.15
Waukegan Ill. A7	16.30
Worcester,Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

ROPE WIRE (A)

Bartonville Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
KansasCity,Mo. U3	13.70
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
Franklin Park,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	11.95
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock

	Col.
AlabamaCity,Ala. B2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

NAILS, Cut (100 lb keg) to Distributors (33)

Wheeling,W.Va. W10 ..$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.)(per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$9.24
Atlanta A11	10.36
Bartonville,Ill. K4	9.34
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	9.34
Donora,Pa. A7	9.24
Duluth A7	9.24
Fairfield,Ala. T2	9.24
Houston S5	10.51
Jacksonville,Fla. M8	9.34
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	9.24
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	9.34
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	9.94
S.Chicago,Ill. R2	9.24
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill. (37) N15	9.24

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$954
Atlanta A11	10.70
Bartonville,Ill. K4	9.64
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.64
Donora,Pa. A7	9.54
Duluth A7	9.54
Fairfield,Ala. T2	9.54
Houston S5	10.85
Jacksonville,Fla. M8	9.64
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	9.54
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.64
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	10.26
S.Chicago,Ill. R2	9.54
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill. (37) N15	9.54

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.59
Atlanta A11	10.75
Bartonville,Ill. K4	9.69
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.69
Donora,Pa. A7	9.59
Duluth A7	9.59
Fairfield,Ala. T2	9.59
Houston S5	10.90
Jacksonville,Fla. M8	9.69
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	9.59
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	9.69
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	10.31
S.Chicago,Ill. R2	9.59
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill. (37) N15	9.59

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill. (7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill. (7) N15	198††

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa. 9-11½ga. J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa. (43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill. (7) N15	192††

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala. R2	17.85	1910**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80†‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80†‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.25	18.80†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.25	19.05††
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality (6 to 8 gage)

	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48)A11	9.10 9.775§
Bartonville(48) K4	9.10 9.80
Buffalo W12	9.00 9.55†
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80†‡
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80†‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
Kans.City(48) S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(1)(48)N15	9.00 9.70†§
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass. A7	9.30 9.85†

Based on zinc price of: *13.50. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras. §§11.50c.

FASTENERS

(Base discounts, shipments of one to four containers, per cent off list, f.o.b. mill)

BOLTS

Machine Bolts

Full Size Body (cut thread)

½ in. and smaller:	
3 in. and shorter	55.0
3¼ in. thru 6 in.	50.0
Longer than 6 in.	37.0
⅝ in., 3 in. & shorter	47.0
3¼ in. thru 6 in.	40.0
Longer than 6 in.	31.0
¾ in. thru 1 in.:	
6 in. and shorter	37.0
Longer than 6 in.	31.0
1⅛ in. and larger:	
All lengths	31.0

Undersize Body (rolled thread)

½ in. and smaller:	
3 in. and shorter	55.0
3¼ in. thru 6 in.	50.0

Carriage Bolt

Full Size Body (cut thread)& Undersize Body (rolled thread)

½ in. and smaller:	
6 in. and shorter	48.0
Larger diameters and longer lengths	35.0

Lag, Plow, Tap, Blank, Step, Elevator, Tire, and Fitting Up Bolts

½ in. and smaller:	
6 in. and shorter	48.0
Larger diameters and longer lengths	35.0

High Tensile Structural Bolts (Reg. semifinished hex head bolts, heavy semifinished hex nuts. Bolts — High-carbon steel, heat treated. Spec. ASTM A-325, in bulk. Full keg quantity)

⅝ in. diam	50.0
¾ in. diam	47.0
⅞ and 1 in. diam	43.0
1⅛ and 1¼ in. diam	34.0

NUTS

(Keg or case quantity and over)

Square Nuts, Reg. & Heavy:

All sizes	56.0

(Full container)

Hex Nuts, Reg. & Heavy Hot Pressed & Cold Punched:

¾ in. and smaller	62.0
⅞ in. to 1½ in., incl.	56.0
1⅝ in. and larger	51.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

¾ in. and smaller	62.0
⅞ in. to 1½ in. incl.	56.0
1⅝ in. and larger	51.5

Hex Nuts, Finished (Incl. Slotted and Castellated):

⅞ in. and smaller	65.0
1 in. to 1½ in., incl.	57.0
1⅝ in. and larger	51.5

Semifinished Hex Nuts, Reg. (Incl. Slotted):

⅝ in. and smaller	62.0
¾ in. to ⅞ in., incl.	65.0
1 in. to 1½ in., incl.	57.0
1⅝ in. and larger	51.5

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Cap Screws, Coarse or Fine Thread, Bright:

6 in. and shorter:

⅝ in. and smaller	35.0
¾, ⅞, and 1 in.	16.0
Longer than 6 in.:	
⅝ in. and smaller	3.0
¾, ⅞, and 1 in.	+11.0

High Carbon, Heat Treated:

6 in. and shorter:

⅝ in. and smaller	20.0
¾, ⅞, and 1 in.	+ 5.0
Longer than 6 in.:	
⅝ in. and smaller	+19.0
¾, ⅞, and 1 in.	+39.0

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter ..+85.0

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam:

6 in. and shorter	+ 5.0
Longer than 6 in.	+29.0

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85. 7/16 in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.40	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
NewHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	....	43.40	55.40	73.00	....
Pueblo,Colo. W12	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St.Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13 ..9.125
Johnstown,Pa. B2 ....9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	14.75
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2 ....15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2,Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.95c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mills bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c or cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.635c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25
Youngstown Y1	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25

ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Alton, Ill. L1	....	....	....	....	....	....	0.25	+15	3.25	+11	6.75	+6.5	9.25	+5.75
Benwood, W. Va. W10	1.5	+25	+10.5	+34	+21	+42.5	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Butler, Pa. F6	4.5	+22	+8.5	+32	+19.5	+41	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+15	3.25	+11	6.75	+6.5	9.25	+5.75
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+26	+7.75	+22	+4.25	+17.5	+1.75	+16.75
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+14	4.25	+10	7.75	+5.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Sharon, Pa. S4	4.5	+22	+8.5	+32	+19.5	+41	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Sparrows Pt., Md. B2	2.5	+24	+10.5	+34	+21.5	+43	0.25	+15	3.25	+11	6.75	+6.5	9.25	+5.75
Wheatland, Pa. W9	4.5	+22	+8.5	+32	+19.5	+41	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Alton, Ill. L1	9.75	+4.75	10.25	+4.25	11.75	+4.5	11.75	+4.5	1.25	+15.5	1.25	+15.5
Benwood, W. Va. W10	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Etna, Pa. N2	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Fairless, Pa. N3	9.75	+4.75	10.25	+4.25	11.75	+4.5	11.75	+5.5	1.25	+15.5	1.25	+15.5
Fontana, Calif. K1	+1.25	+15.75	+0.75	+15.25	0.75	+15.5	0.75	+15.5	+9.75	+26.5	+9.75	+26.5
Indiana Harbor, Ind. Y1	10.75	+3.75	11.25	+3.25	12.75	+3.5	12.25	+3.5	2.25	+14.5	2.25	+14.5
Lorain, O. N3	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	....	....	....	....
Sparrows Pt. Md. B2	9.75	+4.75	10.25	+4.25	11.75	+4.5	11.75	+4.5	1.25	+15.5	1.25	+15.5
Wheatland, Pa. W9	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Youngstown R2, Y1	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5

*Galvanized pipe discounts based on price of zinc at 11.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary, Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates: Carbon Base 5%	10%	15%	20%	Sheets: Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.85	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	$36.20	$43.15

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.810
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward,Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester,N.Y., deld.	69.02	69.52	70.02	....
Syracuse,N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago,Ill. R2	66.00	66.50	66.50	67.00
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon,Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	68.00	68.50	69.00	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.50	76.00	....
Newark,N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
NevilleIsland,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKeesRocks,Pa., deld.	....	67.60	67.60	68.13
Lawrenceville,Homestead, Wilmerding Monaca,Pa., deld.	....	68.26	68.26	68.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	68.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard,Ohio Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield,Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Everett,Mass. E1	67.50	68.00	68.50	....
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton,Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	68.50	69.00	....
Rockwood,Tenn. T3	....	62.50‡	66.50	....
Toledo,Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry. K2	89.00
Keokuk,Iowa O.H. & Fdry. 12½ lb piglet, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$73.00
Rockwood,Tenn. T3 (Phos. 0.035% max)	73.00
Troy,N.Y. R2 (Phos. 0.035% max)	73.00
Philadelphia, deld.	81.67
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075%)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Steel Service Center Products

Representative prices, per pound subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			Standard	PLATES	
	Hot-Rolled	Cold-Rolled	Galv. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††[5]	Structural Shapes	Carbon	Floor
Atlanta	8.59§	9.86§	10.13	....	8.91	9.39	13.24 #	....	9.40	9.29	11.21
Baltimore	8.55	9.25	9.99	....	9.05	9.45	11.85 #	15.48	9.55	9.00	10.50
Birmingham	8.18	9.45	10.46	....	8.51	8.99	....	....	9.00	8.89	10.90
Boston	10.07	11.12	11.92	53.50	12.17	10.19	13.30 #	15.64	10.64	10.27	11.95
Buffalo	8.40	9.60	10.85	55.98	8.75	9.15	11.45 #	15.40	9.25	9.20	10.75
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.25	9.45	10.90	53.00	8.51	8.99	9.15	15.05	9.00	8.89	10.20
Cincinnati	8.43	9.51	10.95	53.43	8.83	9.31	11.58 #	15.37	9.56	9.27	10.53
Cleveland	8.36	9.54	11.00	52.33	8.63	9.10	11.25 #	15.16	9.39	9.13	10.44
Dallas	8.80	9.30	....	....	8.85	8.80	....	....	8.75	9.15	10.40
Denver	9.40	11.84	12.94	....	9.43	9.80	11.19	....	9.84	9.76	11.08
Detroit	8.51	9.71	11.25	56.50	8.88	9.30	9.51	15.33	9.56	9.26	10.46
Erie, Pa.	8.35	9.45	9.95[10]	....	8.60	9.10	11.25	....	9.35	9.10	10.60
Houston	8.40	8.90	10.29	52.00	8.45	8.40	11.60	15.75	8.35	8.75	10.10
Jackson, Miss.	8.52	9.79	....	....	8.84	9.82	10.68	....	9.33	9.22	11.08
Los Angeles	8.70[2]	10.80[2]	12.20	57.60	9.15	9.10[2]	12.95[2]	16.35	9.00[2]	9.10[2]	11.30[2]
Memphis, Tenn.	8.50	9.80	....	....	8.84	9.32	11.25 #	....	9.33	9.22	10.86
Milwaukee	8.39	9.59	11.04	....	8.65	9.13	9.39	15.19	9.22	9.03	10.24
Moline, Ill.	8.55	9.80	....	....	8.84	8.95	9.15	....	8.99	8.91	....
New York	9.17	10.49	11.30	53.08	9.64	9.99	13.25 #	15.50	9.74	9.77	11.05
Norfolk, Va.	8.65	....	....	....	9.15	9.30	12.75	....	9.65	9.10	10.50
Philadelphia	8.20	9.55	10.61	52.71	9.25	9.40	11.95 #	15.48	9.10	9.15	10.40**
Pittsburgh	8.35	9.55	10.90	52.00	8.61	8.99	11.25 #	15.05	9.00	8.89	10.20
Richmond, Va.	8.65	....	10.79	....	9.15	9.55	....	....	9.65	9.10	10.60
St. Louis	8.63	9.83	11.28	....	8.89	9.37	9.78	15.43	9.48	9.27	10.58
St. Paul	8.79	10.04	11.49	....	8.84	9.21	9.86	....	9.38	9.30	10.49
San Francisco	9.65	11.10	11.40	55.10	9.75	10.15	13.60	16.25	9.85	10.00	12.35
Seattle	10.30	11.55	12.50	56.52	10.25	10.50	14.70	16.80[3]	10.20	10.10	12.50
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	10.30	11.55	12.50	57.38	10.75	11.00	14.70	16.80	10.20	10.10	13.00
Washington	9.15	....	....	....	9.65	10.05	12.50	....	10.15	9.60	11.10

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **¼ in. and heavier; ††as annealed; ‡‡¾ in. to 4 in. wide, inclusive; # net price, 1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-finished bars, 2000 lb and over except in Seattle, 2000 to 3999 lb; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Seattle, 30,000 lb and over; [2]—30,000 lb; [3]—1000 to 4999 lb; [5]—1000 to 1999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchens, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa. $145.

Ladle Brick (per 1000 pieces*)

Dry Pressed: Aisey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.
60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.
70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 sts.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $25; barge, Brownsville, Tex., $27.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00
Brazilian iron ore, 68.5%	22.60

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$12.50-13.00*
Domestic, concentrates f.o.b. milling points	16.00-17.00†

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian 91.5c-96.5c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$42.00-44.00†
48% 2.8:1	38.00-40.00†
48% no ratio	29.00-31.00†

South African Transvaal

44% no ratio	19.75-21.00
48% no ratio	29.00-31.00

Turkish

48% 3:1	51.00-55.00†

Domestic

Rail nearest seller

18% 3:1	39.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

50-55%	$2.25-2.40
60-65%	2.50-3.10

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon, ⅜" to under ¼ in.	5.30
Carbon, ¼ in. to 47/64 in.	5.70
Alloy	6.40
Wire (carload lots)	8.40
Bars & Small Shapes:	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	5.00
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.85
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill Products (Per Base Box; 100 lb basis wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots, 400 keg min. (per keg)	$8.15

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh bags	11.25
100 mesh, pails	9.10§
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ⅛ in x 1.3 in.	28.75
1.3 in.	28.75
(In contract lots of 240 tons price is 22.75c)	
Annealed, 99.5% Fe	36.50
Unannealed (99+% Fe)	36.00
Unannealed (99+% Fe) (minus 326 mesh)	59.00
Powder Flake (minus 16 plus 100 mesh)	29.00
Carbonyl Iron: 98.1-98.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500-lb drum, freight allowed, c.l. 38.50; ton lots 40.50	
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	33.30-49.50†
Bronze, 5000-lb lots	50.50-54.60†
Copper, electrolytic	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electolytic: Minus 50 mesh	43.00
Nickel	80.60
Nickel-Silver, 5000-lb lots	51.50-56.00†
Phosphor-Copper, 5000-lb lots	62.80
Copper (atomized) 5000-lb lots	43.30
Solder	7.00*
Stainless Steel, 304	$0.89
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	19.00-32.20‡
Tungsten: Carbon reduced, 98.8% min, minus 65 mesh	Dollars nom**
Chromium, electrolytic 99.8% Cr, min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scrafing grade. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.73
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$6.03	$6.03	$5.98	$5.88	$6.34
Bar Size Angles	6.08	6.08	5.98	5.88	6.34
Structural Angles	5.93	5.93	5.88	5.78	6.18
I-Beams	5.98	5.98	5.88	5.78	6.18
Channels	5.98	5.93	5.88	5.78	6.18
Plates (basic bessemer)	5.70	5.70	5.65	5.55	5.95
Sheets, H.R.	7.00	7.00	6.95	6.85	7.25
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.30	9.30	9.25	9.15	9.65
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.45	9.45	9.40	9.30	9.70
Sheets, C.R. (drawing quality)	8.50	8.50	8.45	8.35	8.75
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.22	25.06	24.91	24.61	26.28
Barbed Wire (†)	7.15	7.15	7.10	7.00	7.40
Merchant Bars	6.08	6.08	6.03	5.93	6.33
Hot-Rolled Bands	6.00	6.00	5.95	5.85	6.25
Wire Rods, Thomas Commercial No. 5	6.10	6.15	6.10	6.00	6.35
Wire Rods, O.H.	6.65	6.70	6.65	6.55	6.90
Bright Common Wire Nails (‡)	7.65	7.65	7.60	7.50	7.90

†Per 82 lb net reel. ‡Per 100-lb kegs, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg	5.00
Toluene, one deg (del. east of Rockies).	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Neville Island, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $245, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $253 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.5% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn; packed, carload 26.8c, ton lot 28.4c, less ton 29.6c.

Electrolytic Manganese Metal: Min carload, bulk, 33.25c; 2000 lb to min carload, 36c; less ton, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome 1: Cr 63%, C 6% max, Si 7% max, 22c. **Charge Chrome 2:** Cr 50-59%, C 8% max, Si 6% max, 23c. Carload, lump, bulk, per lb Cr.

Refined Chrome 1: Cr 50-59%, C 5% max, Si 2% max, 25c. **Refined Chrome 2:** Si 12% max, 24c. Carload, lump, bulk, per lb Cr.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Delivered.

Cr 67-71%, carload, lump, bulk, 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy, carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" x down, 28.25c per lb contained Cr, 14.60c per lb contained Si, 0.75" x down 29. 40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered, Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 14.8c per lb of briquet; c.l., packed, bags 16c; 3000 lb to c.l., pallets 16c; 2000 lb to c.l., bags 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 15.1c per lb of briquet; c.l. packed, bags 16.3c, 3000 lb to c.l., pallets 16.3c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb or briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l.; bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carlot bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

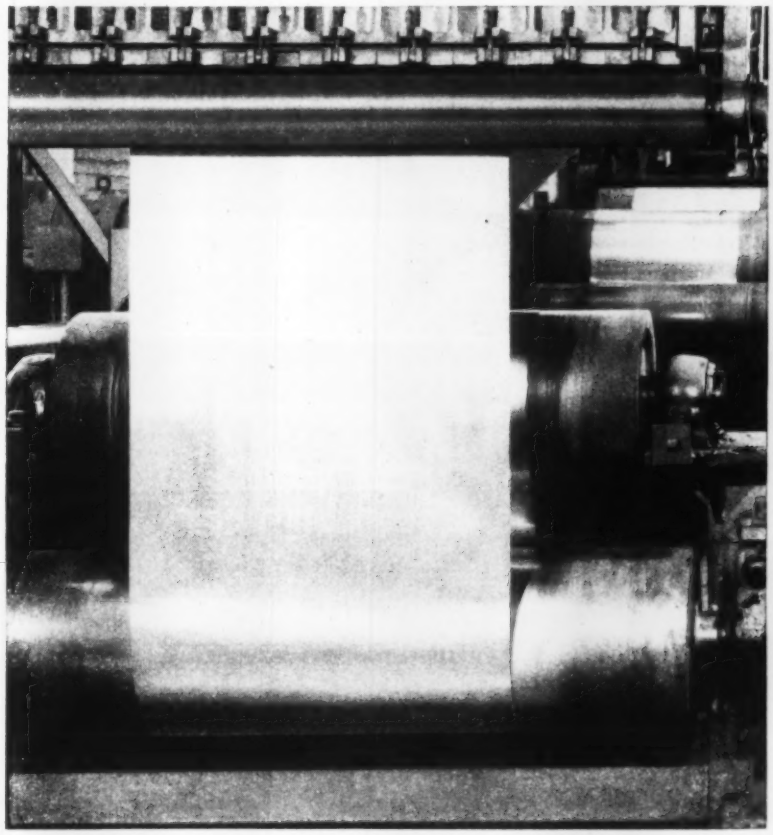
Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

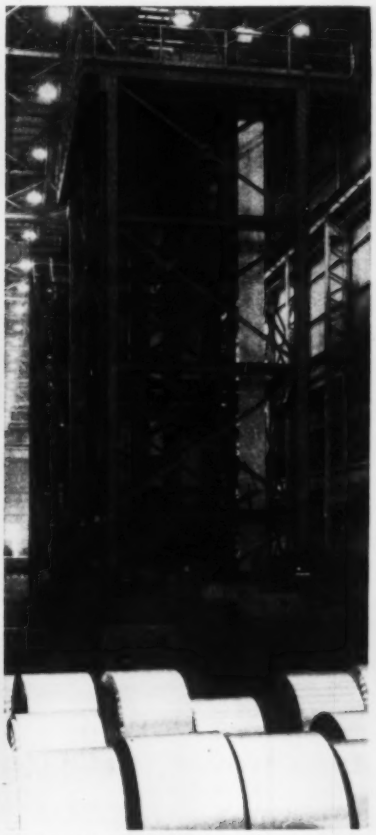
Technical Molybdic-Oxide: Per lb of contained Mo., in cans, $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

AT KAISER STEEL CORPORATION, FONTANA, CALIFORNIA

USS Continuous Strip Tracking System speeds annealing process



Here, the strip enters the furnace section of the line, under positive alignment and control as provided by the USS Continuous Strip Tracking System.



Continuous annealing line, Kaiser Steel Corp., Fontana, Cal.

A USS Continuous Strip Tracking System like the one recently installed at Kaiser Steel's Fontana plant speeds up tin plate production because it *prevents* mis-alignment, rather than trying to correct it after it happens.

The System provides *constant* control of strip alignment throughout the line, without strip distortion, at speeds up to 1250 feet per minute. The specially designed roll complement, including LORIG-ALIGNER Self-Centering ROLLS, maintains strip material on the pass-line without the use of exterior controls.

Processing lines using the Continuous Strip Tracking System turn out strip that is more uniform from coil to coil. This system can process fragile light-gauge strip at elevated temperatures and at speeds not possible with any other type of guiding methods.

United States Steel's Strip Tracking System works equally well in either ferrous or nonferrous metal processing lines. For more information, send in the coupon.

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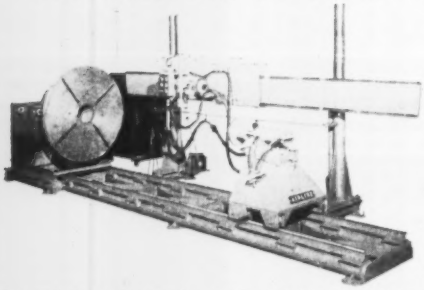
manufacturers of BLASTRITE quality abrasives

Airline MODEL 20420 **Combination Longitudinal and Circumferential TIG Welding Machine**



This Airline unit is equipped with a powered tilting 2500 lb. capacity weld positioner. The turntable is driven with an infinitely variable speed drive and provides a speed range of from 0 to 2 rpm.

This Airline welding machine is equipped with a moveable tailstock and pneumatically actuated quill.

120" headstock to tailstock working clearance.

The precision side beam track for welding head and carriage may be hydraulically raised or lowered for approximate torch positioning. The welding torch is equipped with vernier vertical and lateral adjustments. The carriage is power driven for horizontal traversing at reproducible speeds of from 4 to 88 inches per minute.

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Scrap Price Tone Remains Strong

Consensus in trade is that the market will move to higher levels as soon as mills resume normal operations. Drop of 34 cents in composite on No. 1 heavy is not significant

Scrap Prices, Page 184

• **Pittsburgh**—Brokers for the only mill in the area that's operating paid dealers these prices for small tonnages of heavy melting scrap: $38 for No. 1, $33 for No. 2, delivered to customer's plant. Last month, prices were $2 higher. Because the purchase was less than half of what's normally bought, it doesn't reflect any significant weakening of the market. Fisher Body Div., General Motors Corp., sold its factory bundles to brokers for $45.50—$1 less than they brought last month.

Dealing in futures, a major consumer bought a small quantity (less than 10,000 tons) of No. 2 bundles at $30 for delivery after the strike. In a rather unusual move, it offered brokers 90 per cent of their invoices in advance. Presumably, suppliers will furnish material from their own yards. If they had to go into the open market, they'd be temporarily out of pocket because dealers probably wouldn't sell for less than $28. Railroad scrap prices are mixed.

Premium auto body bundles were sold here last week at $45.50 a gross ton, f.o.b. plant. That's down about $1 a ton from the average price that prevailed in July.

A moderate tonnage of No. 2 bundles went at $30, for delivery to a district mill after the strike ends. That represents an increase of $3 to $4 a ton over recent quotations.

• **Detroit**—The scrap market here is dull with prices unchanged. The only sales recently have been for specially cut No. 1 heavy melting at $37 for shipment to Canada and a relatively small tonnage to a central Ohio mill. Dealers are accumulating stocks in their yards and other storage points on the expectation of a strong market as soon as the mills reopen. Generation of industrial scrap is off at least 25 per cent, counteracting the effects of the drop in consumption.

• **Chicago**—Steelmaking grades of scrap are holding steady in price, but electric furnace and foundry grades have advanced $2 a ton. Demand for foundry grades is quite active while that for electric furnace material is slow.

In the first sale here of No. 1 factory bundles since the strike began an auto body plant got $39.18 on track compared with the previous sales a month ago at $39.17. The purchase of about 3000 tons to be produced this month was made by a broker. On a delivered basis, the transaction figures at about $42 a ton, the current published quotation.

A local mill which is still operating has acquire a small tonnage of No. 2 heavy melting at $32 a ton. This is $2 a ton below the quoted price, but it is unlikely the deal could be duplicated.

• **Philadelphia** — The steel scrap market here continues strong pricewise, due primarily to the large volume moving abroad.

While Lukens Steel Co., Coatesville, Pa., has joined the list of firms whose plants are strikebound, scrap is being piled in local yards for shipment to the plant when the walkout is terminated.

• **New York** — Brokers' buying prices for scrap are unchanged. Steel grades are supported mainly by export requirements; cast grades by purchases for delivery to various domestic shops. Foundries are becoming a bit more concerned about the pig iron supply in view of the continuation of the steel strike and poor prospects for an early settlement. As a result, they are showing more interest in scrap.

• **Buffalo**—Scrap prices continue to hold steady despite the steel strike. Dealers are shipping some primary grades of mill scrap to the Youngstown district and this is helping support the local market.

Dealers' receipts are light since many auto plants are closing for model changeover. Hot weather has slowed the collection of obsolescent scrap. Dealers are stockpiling as much scrap as possible in anticipation of good demand from mills when production is resumed. Steady demand from local foundries for cast scrap continues.

• **Youngstown** — Scrapmen are marking time as inventory continues to pour into scrapyards while little material moves out. Some scrap is going to Copperweld Steel Co. Weirton Steel Co. is buying some No. 2 bundles, although price is unattractive to dealers here because of $3.50 to $4.50 a ton freight charges that must be absorbed.

(Please turn to Page 189)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Aug. 5, 1959. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Aug. 5	$38.33
July 29	38.67
July Avg.	38.45
Aug. 1958	41.58
Aug. 1954	28.80

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*38.00-39.00*
No. 2 heavy melting	*38.00-34.00*
No. 1 dealer bundles	39.00-40.00
No. 2 bundles	*29.00-30.00*
No. 1 busheling	41.00-42.00
No. 1 factory bundles	*47.00-48.00*
Machine shop turnings	20.00-21.00
Mixed borings, turnings	20.00-21.00
Short shovel turnings	*24.00-25.00*
Cast iron borings	*24.00-25.00*
Cut structurals:	
2 ft and under	47.00-48.00
3 ft and under	46.00-47.00
Heavy turnings	34.00-35.00
Punchings & plate scrap	*47.00-48.00*
Electric furnace bundles	47.00-48.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	45.00-46.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	46.00-47.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	*44.00-45.00*
Rails, 2 ft and under	58.00-59.00
Rails, 18 in. and under	*59.00-60.00*
Random rails	*55.00-56.00*
Angles, splice bars	*52.00-53.00*
Railroad specialties	*52.00-53.00*
Rails, rerolling	61.00-62.00

Stainless Steel Scrap

18-8 bundles & solids	230.00-235.00
18-8 turnings	115.00-120.00
430 bundles & solids	125.00-130.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus.	37.00-38.00
No. 1 hvy melt., dealer	35.00-36.00
No. 2 hvy melting	33.00-34.00
No. 1 factory bundles	41.00-42.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	24.00-25.00
No. 1 busheling, indus.	37.00-38.00
No. 1 busheling, dealer	35.00-36.00
Machine shop turnings	17.00-18.00
Mixed borings, turnings	19.00-20.00
Short shovel turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut structurals, 3 ft	*47.00-48.00*
Punchings & plate scrap	*48.00-49.00*

Cast Iron Grades

No. 1 cupola	52.00-53.00
Stove plate	49.00-50.00
Unstripped motor blocks	43.00-44.00
Clean auto cast	58.00-59.00
Drop broken machinery	58.00-59.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00
R.R. malleable	59.00-60.00
Rails, 2 ft and under	*57.00-58.00*
Rails, 18 in. and under	*58.00-59.00*
Angles, splice bars	*52.00-53.00*
Axles	59.00-60.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	210.00-215.00
18-8 turnings	110.00-115.00
430 bundles & solids	115.00-120.00
430 turnings	55.00-60.00

YOUNGSTOWN

No. 1 heavy melting	41.00-42.00
No. 2 heavy melting	30.00-31.00
No. 1 busheling	41.00-42.00
No. 1 bundles	42.00-43.00
No. 2 bundles	25.00-26.00
Machine shop turnings	17.00-18.00
Short shovel turnings	22.00-23.00
Cast iron borings	22.00-23.00
Low phos	44.00-45.00
Electric furnace bundles	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-44.00

CLEVELAND

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	27.00-28.00
No. 1 factory bundles	43.00-44.00
No. 1 bundles	38.00-39.00
No. 2 bundles	25.00-26.00
No. 1 busheling	38.00-39.00
Machine shop turnings	14.00-15.00
Short shovel turnings	20.00-21.00
Mixed borings, turnings	20.00-21.00
Cast iron borings	20.00-21.00
Cut foundry steel	40.00-41.00
Cut structurals, plates 2 ft and under	*47.00-48.00*
Low phos. punchings & plate	39.00-40.00
Alloy free, short shovel turnings	22.00-23.00
Electric furnace bundles	39.00-40.00

Cast Iron Grades

No. 1 cupola	47.00-48.00
Charging box cast	38.00-39.00
Heavy breakable cast	38.00-39.00
Stove plate	44.00-45.00
Unstripped motor blocks	36.00-37.00
Brake shoes	36.00-37.00
Clean auto cast	52.00-53.00
Burnt cast	37.00-38.00
Drop broken machinery	52.00-53.00

Railroad Scrap

R.R. malleable	65.00-66.00
Rails, 2 ft and under	57.00-58.00
Rails, 18 in. and under	58.00-59.00
Rails, random lengths	52.00-53.00
Cast steel	46.00-47.00
Railroad specialties	48.00-49.00
Uncut tires	42.00-43.00
Angles, splice bars	51.00-52.00
Rails, rerolling	58.00-59.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	215.00-220.00
18-8 turnings	110.00-115.00
430 clips, bundles, solids	125.00-130.00
430 turnings	45.00-55.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	33.00
No. 2 heavy melting	31.00
No. 1 bundles	*39.00*
No. 2 bundles	23.00
No. 1 busheling	37.00
Machine shop turnings	14.00
Short shovel turnings	16.00

Cast Iron Grades

No. 1 cupola	*54.00*
Charging box cast	*45.00*
Heavy breakable cast	*44.00*
Unstripped motor blocks	*44.00*
Clean auto cast	*56.00*
Stove plate	*46.00*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00
Rails, 18 in. and under	50.00
Rails, random lengths	*45.00*
Rails, rerolling	*59.00*
Angles, splice bars	48.00

BIRMINGHAM

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	38.00-39.00
No. 2 bundles	23.00-24.00
No. 1 busheling	*38.00-39.00*
Cast iron borings	14.00-15.00
Machine shop turnings	24.00-25.00
Short shovel turnings	27.00-28.00
Bar crops and plates	44.00-45.00
Structurals & plates	43.00-44.00
Electric furnace bundles	38.00-39.00
Electric furnace:	
3 ft and under	37.00-38.00
2 ft and under	36.00-37.00

Cast Iron Grades

No. 1 cupola	55.00-56.00
Stove plate	55.00-56.00
Charging box cast	29.00-30.00
Unstripped motor blocks	42.00-43.00
No. 1 wheels	43.00-44.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00
Rails, 18 in. and under	52.00-53.00
Rails, rerolling	57.00-58.00
Rails, random lengths	46.00-47.00
Angles, splice bars	44.00-45.00

PHILADELPHIA

No. 1 heavy melting	40.00
No. 2 heavy melting	35.00
No. 1 bundles	40.00-41.00
No. 2 bundles	26.00-28.00
No. 1 busheling	40.00-41.00
Electric furnace bundles	42.00
Mixed borings, turnings	20.00†
Short shovel turnings	24.00-25.00
Machine shop turnings	20.00
Heavy turnings	34.00
Structurals & plate	43.00-45.00
Couplers, springs, wheels	45.00
Rail crops, 2 ft & under	58.00-60.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable cast	45.00
Drop broken machinery	50.00-51.00
Malleable	67.00-68.00

NEW YORK

(Brokers buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.00-29.00
No. 1 bundles	30.00-31.00
No. 2 bundles	19.00-20.00
Machine shop turnings	9.00-10.00†
Mixed borings, turnings	12.00-13.00†
Short shovel turnings	13.00-14.00†
Low phos. structurals & plates	36.00-37.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	34.00-35.00

Stainless Steel

18-8 sheets, clips, solids	195.00-200.00
18-8 borings, turnings	85.00-90.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	85.00-90.00

BUFFALO

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	28.00-29.00
No. 1 bundles	33.00-34.00
No. 2 bundles	22.00-24.00
No. 1 busheling	33.00-34.00
Short shovel turnings	21.00-22.00
Machine shop turnings	17.00-18.00
Cast iron borings	19.00-20.00
Low phos structurals and plate, 2 ft and under	43.00-44.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	42.00-43.00
No. 1 machinery	46.00-47.00

Railroad Scrap

Rails, random lengths	45.00-46.00
Rails, 3 ft and under	51.00-52.00
Railroad specialties	43.00-44.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	35.50-36.50
No. 2 heavy melting	30.50-31.50
No. 1 bundles	35.50-36.50
No. 2 bundles	25.00-26.00
No. 1 busheling	35.50-36.50
Machine shop turnings	*17.00-18.00*
Mixed borings, turnings	*17.00-18.00*
Short shovel turnings	*19.00-20.00*
Cast iron borings	*18.00-19.00*
Low phos., 18 in.	45.00-46.00

Cast Iron Grades

No. 1 cupola	*47.00-48.00*
Heavy breakable cast	*43.00-44.00*
Charging box cast	*43.00-44.00*
Drop broken machinery	*53.00-54.00*

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00
Rails, 18 in. and under	55.00-56.00
Rails, random lengths	47.00-48.00

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	*37.00-38.00**
No. 2 heavy melting	*32.00-33.00**
No. 1 bundles	34.00
No. 2 bundles	*24.00-25.00**
Machine shop turnings	17.00
Short shovel turnings	20.00
Low phos. plates & structurals	43.00-44.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Heavy breakable	33.00
Foundry malleable	42.00-43.00
Unstripped motor blocks	38.50-39.50

Railroad Scrap

No. 1 R.R. heavy melt.	34.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*31.00-32.00*
No. 2 heavy melting	*25.00-25.50*
No. 1 bundles	*28.00-29.00*
No. 1 busheling	*28.00-29.00*
Machine shop turnings	*8.50-9.00*
Short shovel turnings	*10.50-11.00*
No. 1 cast	*36.00-37.00*
Mixed cupola cast	*36.00-37.00*
No. 1 machinery cast	*38.00-38.50*

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	35.00-36.00
No. 2 bundles	21.00-22.00
No. 1 busheling	33.00-34.00
Machine shop turnings	12.00-13.00
Mixed borings, turnings	13.00-14.00
Short shovel turnings	14.00-15.00

Cast Iron Grades

No. 1 cupola	47.50-48.50
Stove plate	39.00-40.00
Heavy breakable	40.00-41.00
Unstripped motor blocks	29.00-30.00
Charging box cast	40.00-41.00
Clean auto cast	51.00-52.00

SEATTLE

No. 1 heavy melting	35.00†
No. 2 heavy melting	33.00†
No. 1 bundles	27.00†
No. 2 bundles	22.00†
Machine shop turnings	17.00†
Mixed borings, turnings	17.00†
Electric furnace No. 1	38.00†

Cast Iron Grades

No. 1 cupola	34.00†
Heavy breakable cast	28.00†
Unstripped motor blocks	26.00†
Stove plate (f.o.b. plant)	21.00†

LOS ANGELES

No. 1 heavy melting	*38.00*
No. 2 heavy melting	*36.00*
No. 1 bundles	*35.00*
No. 2 bundles	20.00
Machine shop turnings	*16.00-17.00*
Shovel turnings	*18.00-19.00*
Cast iron borings	19.00
Cut structurals and plate 1 ft and under	45.50

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	46.50

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

SAN FRANCISCO

No. 1 heavy melting	36.00
No. 2 heavy melting	33.00
No. 1 bundles	33.00
No. 2 bundles	22.00
Machine shop turnings	16.00
Mixed borings, turnings	16.00
Cast iron borings	16.00
Heavy turnings	16.00
Short shovel turnings	16.00
Cut structurals, 3 ft	42.00

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

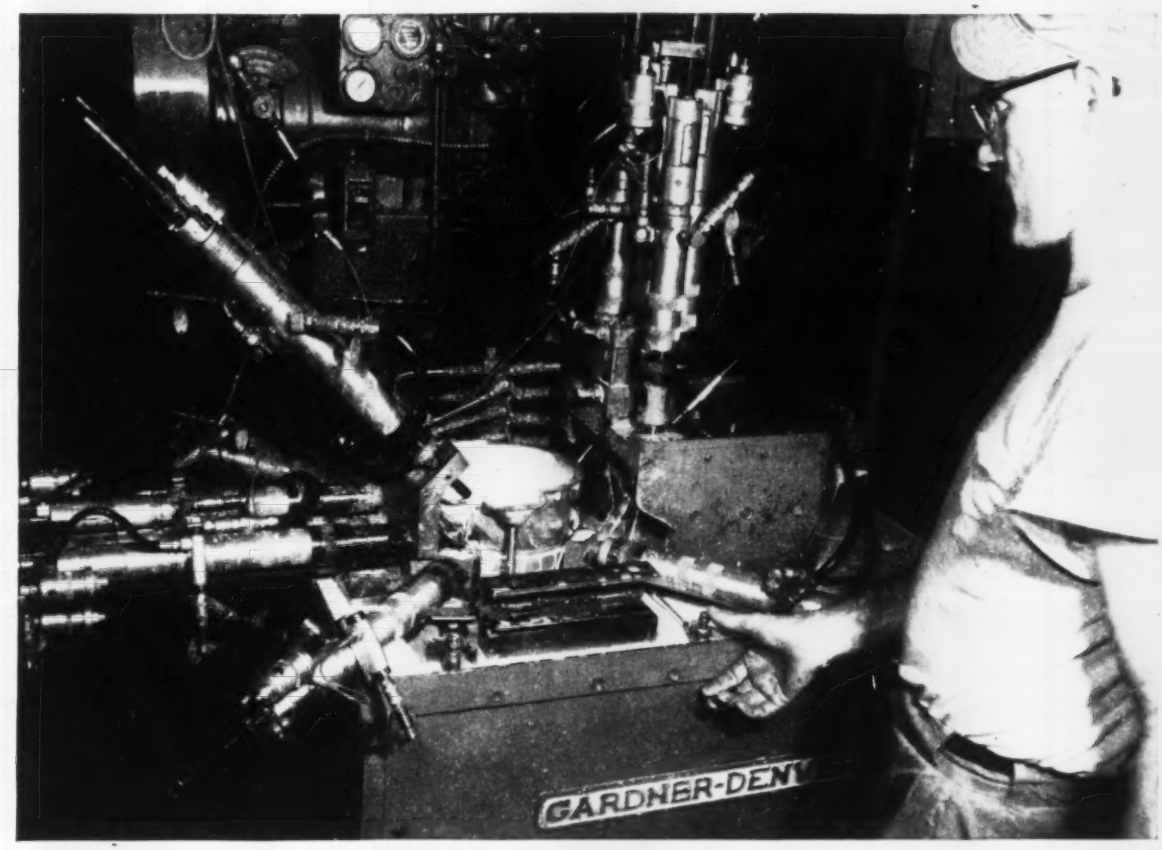
(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	22.75
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory:	
Prepared	32.25
Unprepared	26.25
Short steel turnings	17.00

Cast Iron Grades‡

No. 1 machinery cast	46.50-48.00

*Prices to shippers, f.a.s.
†Nominal.
‡F.o.b. Hamilton, Ont.



Time study clocks multiple drilling operation at 254 pieces per hour

15 HOLES DRILLED IN VACUUM CLEANER MOTOR BASE IN LESS THAN 15 SECONDS

Problem: To speed drilling of fifteen .120″-diameter holes in the motor base of a vacuum cleaner at Eureka-Williams Corporation plant in Bloomington, Illinois.

Solution: A specially designed Gardner-Denver multiple drilling machine. Ten drills, standard Model 92-2P "Airfeedrills"®, are permanently mounted on the fixture. Five "Airfeedrills" are vertically mounted on a reciprocating slide to facilitate loading and unloading the part.

How it works: Operator places the part in the fixture, then activates the following cycle: Two air clamps automatically hold the part in position. Then ten drills automatically start drilling, as the reciprocating slide moves into position and drills the remaining five holes. The operator then presses a release button which returns the reciprocating slide and deactivates the air clamps, leaving the part free for removal.

Cost-cutting results: A recent time study clocked this unique drilling operation at 254 pieces per hour—or a part processed in approximately *15 seconds*. This is a typical example of special machines designed and built by Gardner-Denver to solve tough production problems. For complete information, contact your Gardner-Denver representative.

GARDNER-DENVER Since 1859

1959

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

Custom Aluminum Up in '59

Smelters should turn out a record 450,000 tons this year; hit 750,000 tons by 1965, Nonferrous earnings up. Brass mill shipments climb. Molybdenum prices lowered

Nonferrous Metal Prices, Pages 188 & 189

CUSTOM SMELTED aluminum is becoming a more potent force on the domestic market. This year, smelters will turn out a record shattering 450,000 tons of metal, predicts the Aluminum Smelters Research Institute.

That is better than 20 per cent of the estimated record 1959 production of the primary industry and betters the smelters' former peak production of about 360,000 tons (set in 1957).

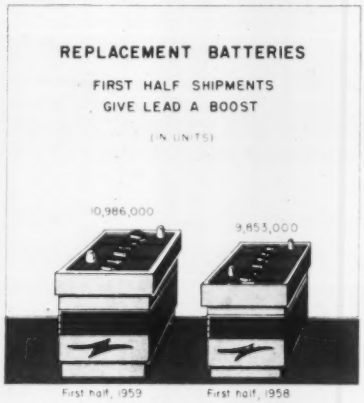
• **Where It's Going**—About 85 per cent of the custom aluminum goes into castings, the remaining 15 per cent into steel deoxidizing, chemicals, and other destructive uses. This year, demand is getting a big push from increased auto output and from stepped up consumer buying of power tools, outboard motors, and appliances.

• **Prospects**—The future's bright. The institute estimates that by 1965 smelters will be turning out 750,000 tons of aluminum a year. Industry observers say the only factor limiting the growth of custom smelted metal is the availability of scrap. This year's output, for example, will come from 350,000 tons of new scrap, 100,000 tons of old scrap. As more and more primary aluminum is used by industry, the amount of new scrap will increase, probably to 500,000 tons a year by 1965. And the spiral in aluminum uses means additional old scrap will filter back to the market. Scrapping of World War II and postwar products should reach 200,000 to 250,000 tons yearly within the next six years—even more after that.

Combining the rising smelter potential, the ability of the primary industry to produce 2,604,750 tons annually by the end of 1960, and the amount of metal that could be made available from foreign producers, it's unlikely you will see any aluminum shortage in the foreseeable future.

Molybdenum Prices Cut

Here's good news for molybdenum users! Prices of forging billets have been reduced about 18 per cent by Climax Molybdenum Co. of Michigan (subsidiary of American Metal Climax Inc.). Comparison: If you formerly bought it in lots of 3000 lb, you paid $9.85 a pound. Now you'll pay $8.40 a pound.



Source Association of American Battery Mfrs. Inc.

A sharp rise in sales (industry-wide they're running about 50 per cent over last year's) plus increased production efficiency have made the reductions possible, says Climax. Because of an increasing number of larger orders, base price quantities now range from 50-100 lb to over 5000 lb. Formerly, over 2500 lb was the maximum order quantity.

Earnings Rise Sharply

Net income of metal producers and fabricators spurted in the second quarter to pull first half earnings sharply above the corresponding period of last year. Both greatly increased sales and generally higher prices contributed to the strengthening in the profit picture. Here's how first half earnings stack up for 13 representative nonferrous companies:

	1959	1958
Alcoa	$28,936,333	$19,471,908
Kaiser Aluminum	13,222,000	11,833,000
Reynolds Metals	19,768,937	19,210,266
Kennecott Copper	47,760,040	22,959,071
Revere Copper & Brass	5,306,453	2,093,132
Bridgeport Brass	3,906,340	1,452,575
Calumet & Hecla	2,737,701	994,196
Copper Range	1,761,121	1,469,169
General Bronze	531,105	261,182
St. Joseph Lead	3,626,343	2,214,361
American Zinc	845,891	446,002
Lithium Corp.	442,587	408,688
Foote Mineral	1,053,712	1,039,477

Brass Mill Sales Jump

If shipments of brass mill products continue at the pace of the first half, sales this year will be the best since 1956.

First half shipments hit 987,422,000 lb, over 200,000 lb better than in the similar period last year. Total for 1958 was 1,538,079,000 lb; for 1957 it was 1,725,881,000 lb; and for 1956 shipments totaled 1,997,866,000 lb.

NONFERROUS PRICE RECORD

	Aug. 5 Price	Last Change		Previous Price	July Avg	June Avg	Aug., 1958 Avg
Aluminum	24.70	Aug.	1, 1958	24.00	24.700	24.700	24.700
Copper	29.50-30.00	July	16, 1959	29.00-30.00	30.048	31.490	26.510
Lead	11.80	May	7, 1959	11.30	11.800	11.800	10.646
Magnesium	35.25	Aug.	13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec.	6, 1956	64.50	74.000	74.000	74.000
Tin	101.75	Aug.	5, 1959	101.875	102.298	104.284	94.995
Zinc	11.00	Feb.	25, 1959	11.50	11.000	11.000	10.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig 99.8%, Velasco, Tex.

HERE'S A PROFITABLE WAY TO PRODUCE BACK RAILS FOR AUTOMOTIVE SEATS

A VERSON CRANK PRESS with a progressive die tool-up

M. P. Heinze Machine Company, Chicago, Ill., is a contract stamper who has to know how to produce profitably in a highly competitive field. As a result, equipment and processes are selected with great care. The setup shown above is a good example:

The press is a Verson 450 ton double crank machine. While it was purchased primarily for producing back rails for automotive seats, it has the versatility necessary for a wide range of jobs. Slide and bolster are 60" x 84". Stroke is 18". Power adjustment of slide is 8". It operates at 20 SPM.

The press is shown tooled with seven station back-to-front feeding progressive dies for the back rails. 59" wide 14 ga. stock is fed from a coil.

Whatever your stamping requirements, get a press that fits them most profitably. The best way to go about it is to talk over your needs with a Verson Representative. Call or write, today.

Originators and pioneers of allsteel stamping press construction

Verson

226

VERSON ALLSTEEL PRESS CO.

9318 S. Kenwood Avenue, Chicago 19, Illinois • 8300 S. Central Expressway, Dallas, Texas

MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES • TOOLING • DIE CUSHIONS • VERSON-WHEELON HYDRAULIC PRESSES

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 24.70; ingots, 26.80, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 28.60; No. 43, 28.40; No. 195, 29.40; No. 214, 30.20; No. 356, 28.60; 30 or 40 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 24.50-25.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.30 per lb deld.

Cobalt: 97.99%, $1.75 per lb for 500-lb keg, $1.77 per lb for 100 lb case; $1.82 per lb under 100 lb.

Columbium: Powder, $55-85 per lb, nom.

Copper: Electrolytic, 30.00 deld.; custom smelters, 29.50; lake, 30.00 deld.; fire refined, 29.75 deld.

Germanium: First reduction, less than 1 kg, 38.30 per gram; 1-10 kg, 33.30 per gram; 10 kg or more, 31.30 per gram; intrinsic grade, 33.30-35.30 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb, f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. sticks, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $234-236 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-100 per troy oz nom.

Palladium: $18-20 per troy oz.

Platinum: $77-80 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $122-125 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7.00 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom.; sheet, $55 per lb nom.

Tellurium: $2.50 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 101.75.

Titanium: Sponge, 99.3 + % grade A-1, ductile (0.3% Fe max.), $1.60; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99 + % hydrogen reduced, $3.30-3.80.

Zinc: Prime western, 11.00; brass special, 11.25; intermediate, 11.50, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.00; special high grade, 12.25 deld. Diecasting alloy ingot No. 3, 14.00; No. 2, 14.50; No. 5, 14.25 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7 per lb; 100-500 lb, $6.50 per lb; over 500 lb, $6 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 26.00-27.75; No. 12 foundry alloy (No. 2 grade), 23.75-24.00; 5% silicon alloy, 0.60 Cu max., 25.00; 13 alloy, 0.60 Cu max., 25.00; 195 alloy, 26.75-27.00; 108 alloy, 24.25-24.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 24.50; grade 2, 23.25; grade 3, 22.25; grade 4, 21.50.

Brass Ingot: Red brass No. 115, 29.25; tin bronze, No. 225, 39.75; No. 245, 33.50; high-leaded tin bronze, No. 305, 33.50; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 26.75.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.895, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.875, f.o.b. Temple, Pa.

COPPER WIRE

Bars, soft, f.o.b. eastern mills, 20,000-lb lots, 35.355; l.c.l., 35.98. Weatherproof, 20,000-lb lots, 36.29; l.c.l., 37.04.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $7.25-17.00; sheared mill plate, $5.25-10.00; wire, $5.75-10.00; forging billets, $3.55-5.75; hot-rolled and forged bars, $4.25-7.50.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 26.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100, 3003 and 5005 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.250-0.136	42.80-47.30	.....
0.136-0.096	43.20-48.30	.....
0.126-0.103	.....	39.20-39.80
0.096-0.077	43.80-50.00	39.30-40.00
0.077-0.068	44.30-52.20	.....
0.077-0.061	.....	39.50-40.70
0.068-0.061	44.30-52.20	.....
0.061-0.048	44.90-54.40	40.10-41.80
0.048-0.038	45.40-57.10	40.60-43.20
0.038-0.030	45.70-62.00	41.00-45.70
0.030-0.024	46.20-53.70	41.30-45.70
0.024-0.019	46.90-56.80	42.40-44.10
0.019-0.017	47.70-54.10	43.00-44.70
0.017-0.015	48.60-55.00	43.80-45.50
0.015-0.014	46.60	44.80-46.50
0.014-0.012	50.80	45.50
0.012-0.011	51.00	46.70
0.011-0.0095	53.50	48.10
0.0095-0.0085	54.60	49.60
0.0085-0.0075	56.20	50.80
0.0075-0.007	57.70	52.30
0.007-0.006	59.30	53.70

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in. 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.40	47.20
5050-F	43.50	48.30
3004-F	44.50	50.20
5052-F	45.10	50.90
6061-T6	45.60	51.70
2024-T4	49.30	56.10
7075-T6*	57.60	64.70

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam.(in.)or across flats*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	76.90	73.90	....	....
0.250	62.00	60.20	89.10	76.60
0.375	61.20	60.00	73.50	68.50
0.500	61.20	60.00	73.50	68.50
0.625	61.20	60.00	69.80	64.20
0.750	59.70	58.40	63.60	60.40
0.875	59.70	58.40	63.60	60.40
1.000	59.70	58.40	63.60	60.40
1.125	57.30	56.10	61.50	58.30
1.250	57.30	56.10	61.50	58.30
1.350	57.30	56.10	61.50	58.30
1.500	57.30	56.10	61.50	58.30
1.625	55.00	53.60	....	56.20
1.750	55.00	53.60	60.30	56.20
1.875	55.00	53.60	....	56.20
2.000	55.00	53.60	60.30	56.20
2.125	53.50	52.10	....	....
2.250	53.50	52.10	....	56.20
2.375	53.50	52.10	....	....
2.500	53.50	52.10	....	56.20
2.625	....	50.40	....	....
2.750	51.90	50.40	....	56.20
2.875	....	50.40	....	....
3.000	51.90	50.40	....	56.20
3.125	....	50.40	....	....
3.250	....	50.40	....	....
3.375	....	50.40	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temner; 2014, 42.20-55.00; 6061, 41.60-55.00; 7075, 61.60-75.00; 7070, 66.60-80.00.

Pipe: ASA schedule 40, alloy 6063-T6 standard length, plain ends, 90,000 lb base, dollars per 100 ft. Nominal pipe sizes: ¾ in., 18.85; 1 in., 29.75; 1¼ in., 40.30; 1½ in., 48.15; 2 in., 58.30; 4 in., 160.20; 6 in., 287.55; 8 in., 432.70.

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	42.70-44.20	51.30-55.50
12-14	42.70-44.20	52.00-56.50
15-17	42.70-44.20	53.20-58.20
18-20	43.20-44.70	55.20-60.80

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-75.30	90.60-91.30
36-38	66.10-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.00-23.50; No. 2 heavy copper and wire, 21.00-21.50; light copper, 19.00-19.50; No. 1 composition red brass, 17.75-18.25; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheets, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	54.13b	51.36c	....	54.32
Yellow Brass	47.24	31.81d	47.78	50.65
Low Brass, 80%	50.03	47.97	50.57	53.34
Red Brass, 85%	51.02	50.96	51.56	54.33
Com. Bronze, 90%	52.55	52.49	53.09	55.61
Manganese Bronze	55.61	49.30	59.74	....
Muntz Metal	49.95	45.26	....	....
Naval Brass	51.90	45.71	58.46	55.31
Silicon Bronze	59.23	58.42	58.77	76.91
Nickel Silver, 10%	62.85	65.18	65.18	....
Phos. Bronze	73.92	74.42	74.42	75.60

SCRAP ALLOWANCES e (Based on copper at 30.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	26.000	26.000	25.250
Yellow Brass	19.625	18.750	17.750
Low Brass, 80%	22.000	21.750	21.250
Red Brass, 85%	22.875	22.625	22.125
Com. Bronze, 90%	23.875	23.625	23.125
Manganese Bronze	18.375	18.125	17.500
Muntz Metal	18.375	18.125	17.625
Naval Brass	18.250	18.000	17.500
Silicon Bronze	25.500	25.250	24.500
Nickel Silver, 10%	24.500	24.250	12.250
Phos. Bronze	27.125	26.875	25.875

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 16.25-16.75; new brass clippings, 14.50-15.00; light brass, 11.25-11.75; heavy yellow brass, 12.25-12.75; new brass rod ends, 12.50-13.00; auto radiators, unsweated, 13.50-14.00; cocks and faucets, 14.00-14.50; brass pipe, 14.00-14.50.

Lead: Soft scrap lead, 7.75-8.25; battery plates, 2.50-3.00; linotype and stereotype, 9.25-9.75; electrotype, 7.75-8.25; mixed babbitt, 9.75-10.25.

Monel: Clippings, 30.00-32.00; old sheets, 26.00-28.00; turnings, 20.00-22.00; rods, 30.00-32.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 39.00-40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 3.25-3.50; new diecast scrap, 3.00-3.25; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 11.50-12.00; clean borings and turnings, 7.25-7.75; segregated low copper clips, 14.75-15.25; segregated high copper clips, 14.25-14.75; mixed low copper clips, 15.00-15.50; mixed high copper clips, 12.25-12.75.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.75-13.25; clean borings and turnings, 10.00-10.50; segregated low copper clips, 17.25-17.75; segregated high copper clips, 16.25-16.75; mixed low copper clips, 16.50-17.00; mixed high copper clips, 15.75-16.25.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.50-11.75; clean borings and turnings, 10.50-11.00; segregated low copper clips, 15.75-16.25; segregated high copper clips, 14.75-15.25; mixed low copper clips, 15.25-15.75; mixed high copper clips, 14.25-14.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 56.00; light scrap, 51.00; turnings and borings, 36.00.

Copper and Brass: No. 1 heavy copper and wire, 25.75; No. 2 heavy copper and wire, 23.75; light copper, 21.50; refinery brass (60% copper) dry copper content, 23.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 25.75; No. 2 heavy copper and wire, 23.75; light copper, 21.50; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 15.00; yellow brass turnings, 14.00; radiators, 17.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.30.

Copper: Flat-rolled, 46.29; oval, 44.50, 5000-10,000 lb; electrodeposited, 36.00, 2000-5000 lb lots; cast, 41.00, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 120.50; 200-499 lb, 119.00; 500-999 lb, 118.50; 1000 lb or more, 118.00.

Zinc: Balls, 18.00; flat tops, 18.00; flats, 20.75; ovals, 20.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.30 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.

Copper Sulphate: 100-1900 lb, 14.95; 2000-5900 lb, 12.95; 6000-11,900 lb, 12.70; 12,000-22,900 lb, 12.45; 23,000 lb or more, 11.95.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,990 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.50; 100-600 lb, 70.20; 700-1900 lb, 67.40; 2000-9900 lb, 65.60; 10,000 lb or more, 64.20.

Stannous Chloride (Anhydrous): 25 lb, 155.00; 100 lb, 150.10; 400 lb, 147.70; 800-19,900 lb, 106.80; 20,000 lb or more, 100.70.

Stannous Sulphate: Less than 50 lb, 140.20; 50 lb, 110.20; 100-1900 lb, 108.20; 2000 lb or more, 106.20.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 183*)

Dealers here point out that they are poorly equipped to absorb much more scrap for inventories because of shortages of ready cash.

• **Cincinnati**—Prices on principal steelmaking grades are holding firm. Shifts in secondary grades saw turnings and borings off $2 a ton in broker quotations. Cast grades moved up $1 a ton as usage expands on the lack of pig iron.

• **St. Louis**—Scrap is scarce and in greater demand. The market has a strong undertone with most cast iron grades $2 to $4 a ton higher. This is due to the fact foundries are running well and not getting enough pig iron. Random length rails and rerolling rails are up $1 a ton.

• **Birmingham**—Scrap continues to come into dealers' yards slowly. Shortages in foundry steel and cast scrap are holding up prices on these grades, although the market is considered soft. There is no buying of open hearth scrap, but other items are moving fairly well at unchanged prices. The export market is fairly active.

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To administer nation-wide sales territory for quality stainless steel importer. This career position is newly created by this wholly-owned U. S. firm and offers unlimited potential with initial salary in 5 figures plus generous bonus arrangement. You will establish your own department and sales force and be able to offer stainless steels at price range substantially below domestic sources. Our people know about this opportunity. To arrange interview at convenient East Coast location, send resume and include present income range.

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CHIEF ESTIMATOR—Sixteen years experience steel plate, pressure vessel and machinery fabrication. Write Box 776, STEEL, Penton Bldg., Cleveland 13, Ohio.

MANAGEMENT EXECUTIVE. Registered Engineer, experienced in pressure vessel, weldments, and structural fabrication. Knowledge of ASME code and welding steel, alloys. Previous responsibilities: sales engineering, estimating, purchasing, labor relations, production, finance. Will invest in proprietary product development. Reply Box 783, STEEL, Penton Bldg., Cleveland 13, Ohio.

IF YOU OPERATE A FURNACE . . . . .

We will purchase your scrap linings, retorts, conveyors, muffles, racks, etc. Any item made of Nickle alloy.

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90 tons 5/16 x 18 x 72 nickel chrome moly SAE 8630 annealed, P. & O. on skids.
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Belgian steel and cement exporter touring United States of America with steel mill executive early September wishes to act as purchasing agent on a commission basis for American steel warehouses and/or importers. For details address Box No. 781, STEEL, Penton Bldg., Cleveland 13, Ohio.

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Experienced Man To Head Our Aluminum Sales Division
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McKees Rocks, Pa.

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HEVI-DUTY
specialists in
electric furnaces

Versatile salt bath furnace has extra pot...will travel

Versatility and portability are the chief advantages of this immersed electrode Hevi-Duty salt bath furnace at Clevite Research Center in Cleveland. Since work here is experimental, the furnace must be used on a wide variety of operations. It is equipped with a welded steel pot for low-temperature heat treating and an interchangeable ceramic pot for temperatures up to 2300° F.

The furnace is coupled with a transformer and mounted on rollers so that it may be used anywhere in the shop.

Perhaps this combination of adaptability and portability can fit into your operation — and save you the cost of two or more specialized furnaces.

Write for Bulletin 655 for further information about Hevi-Duty salt bath furnaces, or outline your particular problem.

- Heat Processing Furnaces
- Dry Type Transformers
- Constant Current Regulators

HEVI-DUTY
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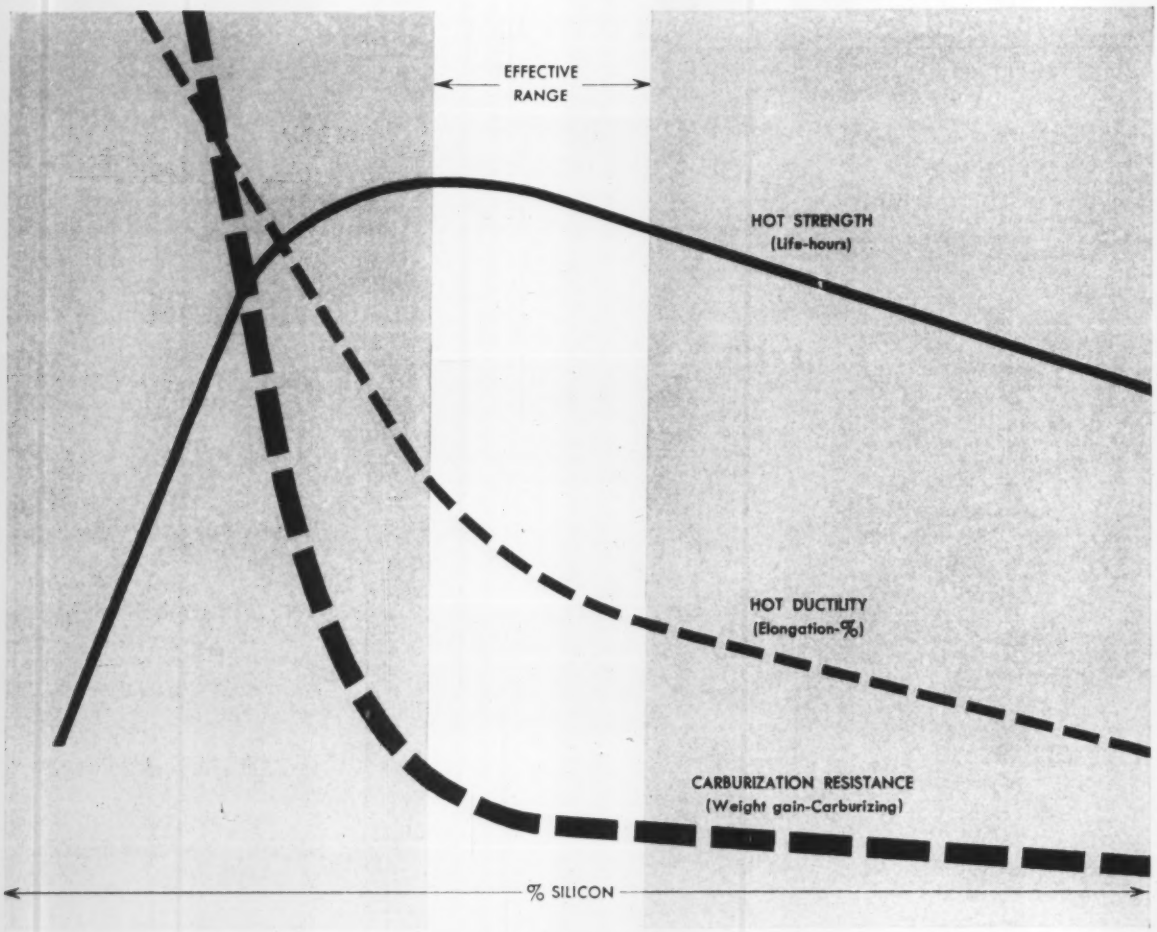

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Silicon content can be used to give heat-resistant alloy castings higher hot strength, higher hot ductility and higher carburization resistance.

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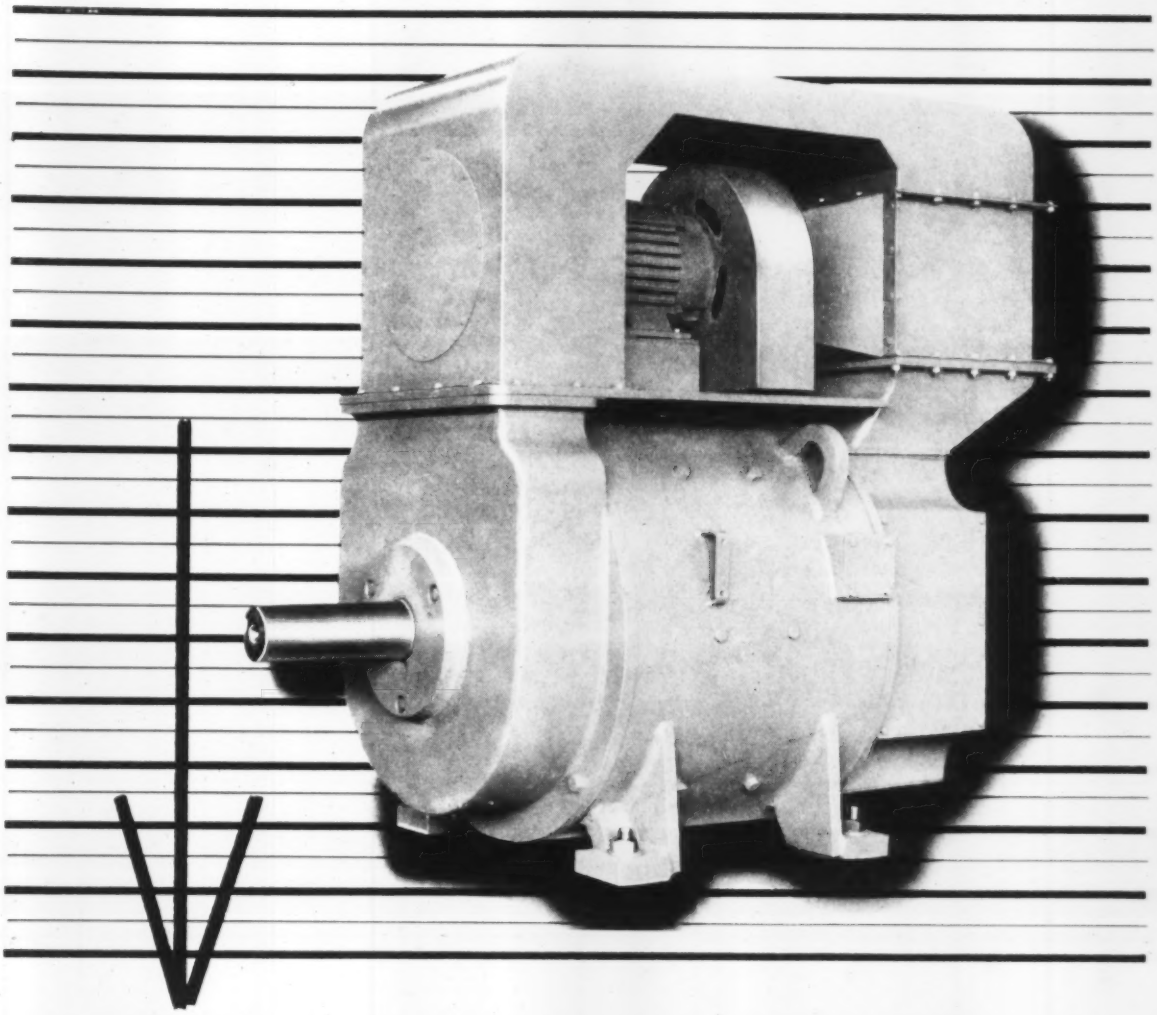


NEW

Totally Enclosed D-c. Motor for LOW SPEED Operating Conditions

Heavy overloads, wide range of operating speeds, dusty atmospheres; that's where the new Super "T" Dual Cooled Motor stands out. It's an enclosed motor with better-than-open operating characteristics.

An independently powered fan pushes ventilating air through the motor and into a heat exchanger. A second fan blows cooling external air across the heat exchanger tubes. Constant ventilation is maintained without introducing outside air into the motor.

The Super "T" Dual Cooled Motor will not overheat even at very low operating speeds. The independent fan motor maintains constant ventilation regardless of the Super "T"s operating speed.

Write today for more information on this new totally enclosed d-c. motor. Available 10 thru 200 hp. C-1606

MASTER REEVES R

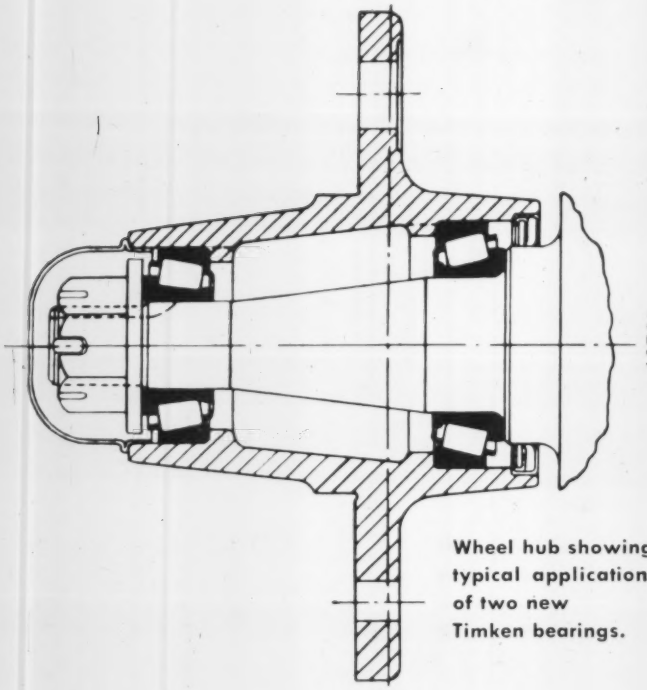
RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 48A , CLEVELAND 17, OHIO

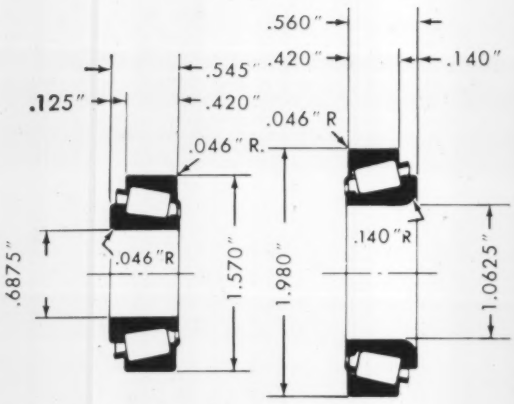
Canadian Division: Toronto, Ontario

Sales Offices and Distributors in principal cities

Three new, low-cost TIMKEN® bearings open new design opportunities



Wheel hub showing typical application of two new Timken bearings.



LM 11749—LM 11710
Wt. .181 lb.

L 44649—L 44610
Wt. .256 lb.

ALSO L44643
SAME AS ABOVE
EXCEPT WITH 1" BORE
Wt. .276 lb.

WITH three new small size Timken® bearings, machine designers can now get the advantages of tapered roller bearings where they couldn't be used before. These new, smaller bearings pack high capacity in less space, and they're lower in cost. They permit more compact designs by keeping related parts smaller—provide additional savings in hub materials, seals, nuts and dust caps.

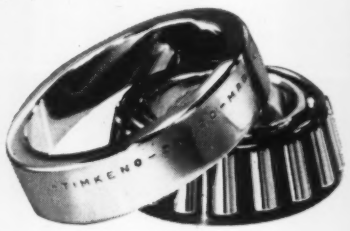
Diagram above at left shows two of them in a typical layout of a front wheel hub for the Automotive Industry's new compact cars. They're the most economical single-row Timken bearings ever produced in bore sizes of 1 1/16", 1" and 1 1/16". Diagram above at right shows principal dimensions and weights.

Like all Timken bearings, these new Timken tapered roller bearings are geometrically designed and precision-made to roll true. Their taper lets them take *both* radial and thrust loads in any combination. And full-line contact between rollers and races provides extra load-carrying capacity.

Our Sales Engineers will gladly give you complete data, help you design the new bearings into your machines. Timken bearings make any machine better, because Betterness rolls on Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



TIMKEN®

TAPERED ROLLER BEARINGS ROLL THE LOAD